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Ecosystem-Based Governance of Forest Commons

The Case of Shkumbini River Basin, Albania

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Acknowledgments

My journey started four years ago, when I decided to shift my research focus into new and challenging paths. The ecosystems and commons discourses are not new to the scientific world, but as a planner, I was highly interested to bring them closer to 'my' territorial research and the professional community I belong to. This linkage, though deemed important, is little if at all explored. Therefore, my challenges emerged both, on a personal and on a research domain level.

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ABSTRACT

Human-environment interactions, embedded into socio-ecological systems are becoming more and more complex, due to increasing human dominance over the planet's resources. Since more than half a century, the discourse on these interactions is dominated by the sustainability development paradigm, but the operationalization of this abstract notion is still in evolution due to its main dilemma – uncertainty. Resilience of ecosystems and institutions, therefore their adaptability and robustness, is a critical path towards understanding sustainable developments and means for achieving it. However, despite growing knowledge on the resilience of socio-ecological systems, three other gaps need further research, namely: 1) the human system of values used to address natural resources in planning and governance. This system is mainly utilitarian and has limited considerations on the egalitarian and moral & ethics perspectives on natural resources; 2) the slow process of embedding ecosystem principles and values in governance and spatial planning, as a mean to linking governance with balanced territorial development; 3) and the mismatch between scales of governance, from the successful traditional commons' regimes to the global threats and policies.

The above gaps show that linkages between theoretical work on common pool resources – a successful model of collective action at small community scale, and ecosystem based governance – a scientific and territorial governance model, are either missing or weak. It is in the intention of this research to explore opportunities for establishing these linkages, and hopefully contribute to the global discourse on spatial-temporal mismatches between institutions and governance models, through creating a model of research. An ecosystem-based governance of the natural resources is needed to mitigate territorial mismatches, and achieve sustainable and balanced territorial development.

This research is developed around the central question of whether forest commons' models/regimes can positively influence the conventional governance setting in favour of sustainability, and outmatch the 'boundaries and scales' mismatch. Forest is chosen as the natural resource that contributes through its ecosystem services to balanced and resilient territorial development on both, the small and the global scale. Methodologically, the geographical area of research is one river basin, as a natural and functional space for ecosystems services boundaries. The river basin is composed

of several ecosystems and human settlements in a continuous interaction, and constitutes a larger-scale common, or a polycentric network of commons.

Besides developing a critical discussion on common pool resources and ecosystem services theories, the research includes fieldwork through: visually surveying the basin and the forests; focus groups with commoners to identify and test the 8 design principles of robust commons' institutions; interviews with officials and experts to analyse SESMAD variables for the large scale commons; and water tests and questionnaires for forest users to unravel the concept of ecosystem services (ES) valuation. A mapping of ES supply-demand budgets is made to link the governance system with the territorial effects of ecosystem services. The existence of various values within the common's institutions is then verified. The research provides a logical framework for the further and deeper study of ecosystem-based governance of forest commons, as a means for linking institutions with the territory and scientific knowledge on ecosystem services. The latter is the key to enabling sustainable development in a world of spatial-temporal scale mismatches as regard natural resources and the services they render to humanity.

ABSTRACT

Le interazioni uomo-ambiente incorporate nei sistemi socio-ecologici stanno diventando sempre più complesse, a causa dell'aumento del dominio umano sulle risorse del pianeta. Da più di mezzo secolo, il discorso su queste interazioni è dominato dal paradigma dello sviluppo sostenibile, ma l'applicabilità di questa nozione astratta è ancora in evoluzione a causa del suo principale dilemma: l'incertezza. La resilienza degli ecosistemi e delle istituzioni, quindi la loro adattabilità e solidità, è un percorso critico verso la comprensione degli sviluppi sostenibili e dei mezzi per raggiungerli. Tuttavia, nonostante le crescenti conoscenze sulla resilienza dei sistemi socio-ecologici, altre tre lacune necessitano di ulteriori ricerche, in particolare: 1) il sistema umano di valori utilizzato per indirizzare le risorse naturali nella pianificazione e nella *governance*. Questo sistema è principalmente utilitaristico e ha considerazioni limitate sulle prospettive egualitarie e morali ed etiche delle risorse naturali; 2) il lento processo di integrazione dei principi e dei valori dell'ecosistema nella *governance* e nella pianificazione territoriale, come mezzo per collegare la *governance* con uno sviluppo territoriale equilibrato; 3) e la mancata corrispondenza tra i livelli di *governance*, dai regimi tradizionali di successo dei beni comuni alle minacce e politiche globali.

Le lacune sopracitate mostrano che i collegamenti tra il lavoro teorico sulle risorse dei beni comuni - un modello di successo dell'azione collettiva su piccola scala comunitaria, e la *ecosystem-based governance* - un modello di *governance* scientifica e territoriale, sono entrambi mancanti o deboli. L'intenzione di questa ricerca è esplorare le opportunità per stabilire questi collegamenti e, auspicabilmente, il contribuire al discorso globale sul superamento della mancata corrispondenza spazio-temporale tra istituzioni e modelli di governo, attraverso la creazione di un modello di ricerca. È necessaria una *governance* basata sui principi dell' ecosistema delle risorse naturali, per attenuare le mancate corrispondenze territoriali e ottenere uno sviluppo territoriale sostenibile ed equilibrato.

Questa ricerca si sviluppa attorno alla seguente questione centrale: possono i modelli / regimi dei beni comuni forestali influenzare positivamente l'impostazione della *governance* convenzionale a favore della sostenibilità e superare la mancata corrispondenza tra "confini e scale"? La foresta viene scelta come la risorsa naturale che contribuisce attraverso i suoi servizi dell'ecosistema a uno sviluppo territoriale

equilibrato e resiliente su entrambe, la piccola e la scala globale. Metodologicamente, l'area geografica di ricerca è un bacino fluviale, come spazio naturale e funzionale per i confini dei servizi degli ecosistemi. Il bacino fluviale è composto da diversi ecosistemi e insediamenti umani in un'interazione continua e costituisce una maggior risorsa del bene comune o una rete policentrica delle risorse comuni. Oltre a sviluppare una discussione critica sulle teorie delle risorse del bene comune (*commons*) e dei servizi dell'ecosistema, la ricerca include il lavoro sul campo attraverso: l' osservazione diretta del bacino e delle foreste; *focus groups* con gli utenti delle risorse del bene comune per identificare e testare gli 8 principi di *design* delle solide istituzioni delle risorse comuni; interviste con funzionari ed esperti per analizzare le variabili SESMAD per *commons* su larga scala; e test dell'acqua e questionari per gli utenti della foresta per decostruire il concetto di valutazione dei servizi dell'ecosistema. Una mappatura dei bilanci della domanda e dell'offerta (SE) è realizzata per collegare il sistema di *governance* agli effetti territoriali dei servizi dell'ecosistema. L'esistenza di vari valori viene quindi verificata all'interno delle istituzioni delle risorse comuni. La ricerca fornisce un quadro logico per l'ulteriore e più approfondito studio della *governance* basata sui principi dell'ecosistema sui beni comuni forestali, come mezzo per collegare le istituzioni con il territorio e le conoscenze scientifiche sui servizi degli ecosistemi. Queste ultime sono la chiave per consentire lo sviluppo sostenibile in un mondo di disallineamenti spazio-temporali in termini di risorse naturali e dei servizi che rendono all'umanità.

INTRODUCTION

I. The Scope: Human and Environment Interaction

We live in a world of rapid changing pace, vastly caused by humans. During eighties, we spoke of a world where only urban systems were human-dominated, while today virtually all of Earth's ecosystems and the planet at large are human-dominated. (Vitousek et al., 1997); (Messerli et al., 2001); (Matlock & Morgan, 2011); (Gerstner , 2017).

In simple terms, humans are, equally as other species and organisms in the ecosystem merely an element of the very complex network of life on Earth. This implies that an ideal equilibrium of the biophysical system exists and will be lost in case of any dominance. The loss of an equilibrium leads to new ones, but the associated processes may be long and full of unpleasant effects, may be often unpredictable, or too costly to predict. This is especially true in the case of human dominance due to the dual positioning of humans as part of both, the natural and the social capital. As Boserup's theory on population and growth learns us, the level of productivity achievable in an environmental zone depends on technology or physical capital and on the available human and social capital (VanWey et al., 2005). This all leads to the formation of socio-ecological systems that with their high complexity of features and interactions are key to the future existence of Earth's natural capital, and therefore in a vicious circle, to humanity.

With their biological and social needs humans have altered environment to a great deal and we see evidence of this change all around (Moran, 2005). They often pose threats to the environment, especially to the biodiversity, through harvesting products from the ecosystems, being those natural or man-made, such as the agricultural areas. Not all human [harvesting] practices lead to decline in biodiversity – sometimes, these practices enhance the habitat for species to thrive. However, because our knowledge of biodiversity is still incomplete, it is actually difficult to fully understand how human actions may damage or support biodiversity (Randolph et al., 2005). Randolph (2004) proposes 4 ways through which human-environment interactions set their effects:

- "The environment poses certain natural hazards to human society.
- Society-generated pollution impacts human health through the environment.
- Society exploits economically important natural resources at unsustainable rates.
- Pollution and overuse undermine productive natural systems, services and ecosystems." (Randolph, 2004).

Of all of the changes, land use and land cover alterations due to exploitation and unsustainable use or overuse, seem to have some of the greatest consequence for both, humans and other species. The change of forest cover is particularly important in this respect, due to the large number of ecosystem services provided by them, their role in climate regulation and sequestration of vast amounts of carbon (Moran, 2005), for being habitats to a multitude of species by holding the majority of world's terrestrial species (Luque et al., 217). Humans benefit from forests to satisfy their consumptive and non-consumptive needs, being those direct or indirect. Furthermore, forests provide stabilization of the hydrological and climate systems, scientific knowledge and cultural value, which are non-consumptive service to humans, but highly important to human existence and liveability.

Box 1. Some facts on the role of forests - quotations from IUCN (2012) and CIFOR (2015)

Around 1.6 billion people around the world depend to varying degrees on forests for their livelihoods.

Forests make up 22.2% of household incomes in developing countries (Angelsen et al. (2014) in (CIFOR, 2015).

More than 300 million people live in forests and according FAO (2014) 764 million people rely on fuel wood to boil their water.

Women living in forests generate more than half their income from forests, compared to one-third for men.

According to FAO reports in 2013 and 2014, wood energy provides 9% of the global primary energy supply.

Forests cover 31% of total land area and are home to 80% of the world's terrestrial biodiversity.

More than 40% of the world's oxygen is produced by rainforests and forests and forest soils store more than 1 trillion tons of carbon.

More than a quarter of modern medicines, worth an estimated US$ 108 billion a year, originate from tropical forest plants.

Source: (IUCN, 2012); (CIFOR, 2015)

Land use land cover changes are attributed by many theorists to the population and household pressures, but also to other aspects of human life, such as the influence of political and economical systems, governmental policies that result into particular property regimes and ownership rights, as well as various forms of taxation for redistributive purposes, the features of the various ecological systems that humans are linked to or make use of, and the way people and their actions alter the landscape, culture, institutions and they way they work. While these different theoretical views, starting with the traditional Malthusian theory, continuing with Boresup's views, the landscape ecology, the collective action theory, etc. may have specific limitations, they all shed significant light on the interactions between humans and environment and offer analytical ways of thinking in terms of human-environment interdependencies and applying theoretical principles in empirical work. VanWey et al. (2005) describe this framework as the multiscalar approach, which considers structural theories of population and environmental change, actors' decisions in front of these changes and biophysical and social structures at various levels of aggregation (VanWey et al., 2005). This approach feeds into the argument for **interdisciplinary work** as the way to understand the complexity of the **human-environment relationships**. Green et al. (2005) define that a common understanding across disciplines, especially when attempting to link social sciences with physical sciences (Green et al., 2005) is needed in this framework.

The effort to study environment through interdisciplinary lenses and most importantly include the human dimension, hence exploring human-environment interactions, was initiated as of early 1990s. Since then, valuable scientific and theoretical advancements have been made, but new gaps and areas or research are as well identified, increasing further the complexity of work. Grünwald & Wende (2015), referring to Breuste *et al.* (2011) and Richter and Weiland (2012), summarise Endlicher (2011) arguing that "optimizing interactions between humans and the environment should be a priority" (Grünwald & Wende, 2015). This is extremely important as, while theoretical knowledge exists and awareness on the effects of human dominance on the planet's sustainability is there, the instruments for turning this knowledge into policy actions are still far from being successful.

The need for interdisciplinary work should extend beyond scientific research, to include linkages between the study of environmental sciences and the inclusion of

their results in decision-making and particularly in territorial governance. The management of ecosystems is object to intense and cross-disciplinary debates related to ecosystem conservation and protection and institutional arrangements that define the relationship between nature and humans (Keune *et al*., 2014). Territorial governance is about decisions being taken on the use of resources on the territory, harmonising the interests of the stakeholders and guaranteeing sustainability of the ecosystems, while addressing human development and needs. Therefore, having the possibility and capacity to transfer the ecosystems' services knowledge into the spatial planning and territorial governance practices and decision-making is key to achieving the optimised results of human-environment interactions as described by Endlicher (2011).

Box 2. Human - Environment Interactions in Albania

The conflict between environment and human-led territorial developments is stronger than ever in Albania. It started in early `90s, through a dramatic political and economic system shift from a centralized economy to the market one, and was right away followed by major changes in terms of social aspects, territory and resources, governance and citizens` mentality. An internal population migration was initiated from people in search for better services and economic development opportunities, and resulted in a growing need for affordable housing. As the government could not respond to this high pressing demand, people moving from remote areas to urban ones crafted their own individual solutions, characterized by occupation and fragmentation of agriculture land, water pollution, informal deforestation, wetlands pollution and alteration, losses on biodiversity including species' extinction risk. This behaviour was defined as 'a natural response' to immediate needs for affordable housing, but neither the community, nor the institutions thought about the implications and costs born with the loss of the ecosystem functions (Shutina & Toto, 2010).

No planning efforts or public policy were in place to guide these territorial transformation processes and the exploitation of natural resources by the citizens was grounded on basic survival needs. Certain planning and territorial policy instruments that the government developed after the year 2000, with the initiation of the first significant government decentralisation reform, were too fragmented and with a sectorial focus only. Consideration of the environmental perspectives and human development were far from the horizon. The planning approach was rigid, focused on

urban areas only, highly anthropocentric and in disregard of other than the provisioning ecosystem services. Furthermore, utility or instrumental values had an absolute primacy over values related to the ecosystem services, i.e. use, intrinsic and inherent ones as Beatley (1994) classifies them.

The evolution of the Albanian environmental institutions in the first decade of the 21st century, the territorial planning reform that embraced an integral approach towards sustainability, the revisited decentralization reform and the administrative-territorial reformation of municipalities, gave a new breath at least on an institutional level to the integration of environment as a key dimension in all policy-making. Spatial planning is methodologically comprehensive, cross-sectorial and not merely urban. It analyses and provides strategies and development projects for the territory, being urban, agricultural and natural landscape.

Nevertheless, regardless of these improvements, the Albanian ecosystems are constantly threaten by human developments and bear human harm. Albania has lost 47% of its agriculture land (INSTAT, 2012); (Ceko, 2015) in the last 30 years and forestland has reduced with 3% in 12 years[1]. The Shkumbini river basin only has lost 258km^2 of cropland from 1988 to 2003, equivalent to 28% reduction (Müller & Munroe, 2008). In terms of forests, 202 km^2 or approximately 13% that was forestland in Shkumbini basin in 1988, was cleared in 2003 (Müller & Munroe, 2008). Air pollution is high in the cities due to mainly carbon monoxide and lead from the transport sector, and dust (particular matter) from the construction sector. Pollution of rivers, lakes and coastal areas persists since 3 decades as a result of poor urban waste management (AKM, 2014); (AKM, 2016).

This is so because institutional improvements and reforms have not managed as yet to influence people's mentalities on how to make careful use of the natural resources, and scientific awareness has not made its way to the concrete policy actions. The need to induce strategic thinking at all layers of the society remains prevalent, together with the continuous demand for stakeholders' involvement in decision-making, capacity building, and multi-layers governance for flexibly organic territories instead of the artificially established administrative unit.

II. Defining the Problem

2.1 Understanding Resilience within the framework of Sustainability

Environmental problems are dealt with through the concept of sustainable development (Handmer & Dovers, 1996). There are a number of definitions on this abstract concept, but there is an overall agreement by now that sustainable development is a norm that promotes equity and justice within and among generations from a social, economic and environmental perspective (Derissen *et al*., 2009) (United Nations, 1987). Sustainable development is a critical concept to the study of human-environment interactions, because the integration of the human-biosphere relations and of subsequent dimensions is inherent to the concept. More and more, when thinking about sustainable development a concern arises regarding the development that makes use of the biosphere's resources to meet the demands of human population in a stable way, therefore without compromising the health and capacity of the biosphere to respond to the demands of the generations in continuum (Handmer & Dovers, 1996). The widely accepted definition was basically formulated by the Bruntland report as development "that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs" (United Nations, 1987). The concept entails two components: on the one side is the human demand that has to be restrained, reshaped and/or managed, and on the other the capacity and ability of the biosphere – the natural resources to respond to the changing human demand.

The report defines a set of values that shape the human demand and this should not be overlooked: utility, overall welfare and poverty reduction are key drivers, but these aside, there are also equity, "moral, ethical, cultural, aesthetic, and purely scientific reasons for conserving wild beings" (United Nations, 1987). Further, people should model their existence within the planet`s ecological means and those who are more affluent should develop life styles to guarantee it. The report goes further by stating that for all these to happen, political systems and institutions should develop in such a way as to promote inclusion and democracy in decision-making, avoid fragmentation and unhealthy independence in natural resources management by considering them as key to the health of social and ecological relations, and endorse a cooperative behaviour within and between levels of governance, whether these are local, national or global.

An important definition coming from the report and telling us a lot about the nature of human demand, is that "in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs" (United Nations, 1987). Not only is this telling that human demand is in constant evolution; it is also telling that sustainable development can and should cope with the certainty and the uncertainty of change and for this reason it should create decision-making and management approaches that are able to face uncertainty (Handmer & Dovers, 1996).

In their analysis of sustainable development, Handmer and Dovers (1996) try to move from the moral approach definition as provided above, by defining sustainable development in terms of system and responses to change. Handmer and Dovers (1996) offer a definition of sustainability, considering it as the ability of socio-ecological systems *to withstand or adapt to changes* indefinitely. This definition provides in fact an adequate transition to the concept of resilience for both, social and ecological systems. Thus, to what extent the stock of natural resources has to be maintained, can be adapted and can absorb the disturbance that causes the change, is a primary question of sustainable development (Derissen *et al*., 2009) and it describes the resilience of the system. In social-ecological systems, the resilience is an attribute of both, the ecological dimension – concerned with longer survival and immediate recovery of ecosystems in changing environments, and the social dimension – concerned with the preservation of the human routine and welfare (Perrings, 2006) (Handmer & Dovers, 1996).

The definition of resilience comes from various scholars, several of them concerned with ecological resilience as the primary domain for the concept, and others with the resilience of the social and economic and governance systems, lying significantly on the ecological theories. Pimm (1984) interpreted resilience as "the speed of return to equilibrium following perturbation", while Holling (1973) as "the size of a disturbance needed to dislodge a system from its stability domain" (Perrings, 2006, p.417). Perrings (2006) continues further by listing four aspects to resilience as identified by more recent developments in ecology – precisely by Gunderson and Holling (2002) and Walker *et al.* (2004): a) the degree to which a system can be modified before losing its recovering ability; b) the capacity of a system to prevent

itself from changing; c) the position of the system to the threshold; d) and the divergence or convergence between cross-scale effects within the system (Perrings, 2006).

Mäler (2008) regards resilience as "an insurance against flips of the system into different basins of stability" (Mäler, 2008, p.17). In his argument of linking resilience with sustainable development, he considers resilience as a productive asset, whose change will impact whether an economy is in a sustainable path or not and it is measured by the "maximum perturbation that we can make to the system without forcing it into another regime". (Mäler, 2008, p.18). Armitage (2008), argues after analysing a number of authors that "resilience incorporates: (1) the ability of a system to absorb or buffer disturbances and still maintain its core attributes; (2) the ability of the system to self-organize; and (3) the capacity for learning and adaptation in the context of change" (Armitage, 2008, p.15).

Regardless of any theoretical differences that may exist, research shows two commonalities among authors: 1) studies on ecological resilience have a strong impact on the theoretical thinking of social and economic resilience. Therefore authors, consider resilience as a subset, a component, a dimension, or a way of unravelling the concept of sustainable development. "Levin *et al.* (1998) claimed that resilience is the preferred way to think about sustainability in social as well as natural systems" (Perrings, 2006, p.417); 2) resilience is concerned with (certain or uncertain) *changes* affecting a system and the behaviour/response of natural and socio-economic systems to this change. Scholars provide *two attributes* of the system affecting its resilience in this respect – *adaptive capacity and robustness*. These two attributes may seem rather contradictory at first, but in fact are mutually completing with regard to the systems' resilience. The adaptive capacity is related to the heterogeneity and diversity within a system, while robustness to those properties that allow the system to accommodate perturbations without additional adaptation and without losing functionality (Perrings, 2006)[2].

Adaptive capacity and robustness are thus key attributes in designing institutions and enabling governance approaches that address the sustainable development of socio-ecological systems. This comes strongly from literature on resilience and sustainability, but the research on institutional design and diversity shows that while it may seem obvious that *flexibility, learning and adaptation* should be essential

components of institutional design, this is not often the case – neither in theory nor in practice (for instance private and government ownership on land and resources as the two ideal forms for long-term protection of natural resources) (Nagendra & Ostrom, 2012). The typical top-down government approach shows constant reluctance in adopting learning and adaptation as key features of its construct, while the bottom-up approaches can hardly cooperate with an official hierarchical system. This can only happen through a complex system of governance that is based on the cooperation of multiple social actors across levels and scales of organization (Armitage, 2008).

Ostrom and other scholars highlight frequently the need for institutions and institutional models that fit to the context and are adaptable to change, as the way of governing [complex] socio-ecological systems towards their sustainability. They consider the sustainability of the systems as highly linked to the governing institutional diversity and therefore to the adaptive capacity as well as to the robustness of the system itself. The system encompasses the natural resources that play such a critical role on the community livelihood, adaptation and resilience (Ratne, 2011), and the communities and their ability to bounce back from disturbances (Barnes *et al*., 2017).

Understanding the systems' robustness and their adaptive capacity is a challenging task if bearing in mind that socio-ecological systems are complex and in constant change, in time and space, with uncertainty as a key-facing dilemma. However, it is also a necessity in a societal context where [strong] resistance to change, or change at the margins is often considered as the mainstream type of resilience (Handmer & Dovers, 1996) and therefore institutional approach. In order to cope with the society's vulnerabilities and uncertainties that the sustainable development approach constantly faces, there is a need to embark on an "openness and adaptability" type of resilience (Handmer & Dovers, 1996) and shape institutions and governance to lead the society into this direction. To happen, this requires further research on an academic and theoretical level, as well as new sets of policies and institutional set-ups.

2.2 [Forest] Ecosystems – Between Values and Property

The concern about forests conditions and governance is more and more increasing on a global scale. The relevance lies on the large number of services that forest ecosystems render to humanity with carbon sequestration being the first in the list on

a global level. While several international and global policy-making processes are striving to address global deforestation and related climate change issues, it is similarly important to focus on the small local scale (Kluvankova *et al*., 2015); (Kluvánková & Gezik, 2016); (Ostrom, 1999); (Ostrom, 2009b). This is the scale where forest users live and carry out daily activities that slowly, but steadily impact the health of their forests and therefore the health of a planet. These communities live with forests and are primary users therefore the management rules they create affect forest conditions significantly (Arnold (1992) in (Gibson *et al*., 2000/a)). These rules reflect forest-users interactions, which develop out of a set of human institutions, mutually recognised claims and decision-making powers (Gibson *et al*., 2000/a) that people force over forests as natural resources. And then a few questions arise – How do people define these rules? How do they define and assign rights for forest use? Do the primary users (small scale) have more or less rights than others (large scale) who benefit or bear the impacts of forest conditions? A theory on property rights on natural resources has developed around these questions. However, what remains striking is the value reference system that people use to both, answer these questions and take decisions on how forests are used.

Environmental concerns reflect values. Made by humans and built on their perspective, this is of course an anthropocentric statement, but it actually shows that the challenge of ensuring sustainable development is basically a value-oriented debate and struggle, and hence not an easy one. Humans need ecosystems and their services to sustain their survival and more than that, their social and economic welfare. To achieve this purpose, humans use the natural resources based on a set of societal values. The latter are culture and context dependent, often varying from direct provisioning of utility to cognitive development (Chan *et al.*, 2011), but in overall remaining purely anthropocentric. Even in the case of services that regulate or support primary processes in nature, being thus considered external benefits to humans, the attributed values are human-oriented – it implies sacrifices that humans make to protect the ecosystems and values assigned to this sacrifices, but to the extent that humans gain well-being from doing so (Goulder & Kennedy, 2011).

While it may be criticised for being human-oriented, the valuing of the natural capital and its services remains highly beneficial, because it makes a significant effort to add the natural capital dimension in the utilitarian system that dominates the world. “Since

the beginning of modern times attitudes and positions designed for individual utility maximisation have prevailed" (Grunewald & Bastian, 2015b, p.27). In fact, next to the philosophies of ecosystem valuing (Goulder & Kennedy, 2011), the world is made of broader philosophical approaches that explain or shape human behaviour and interests, with utilitarianism being the dominating one. Utilitarianism is a consequentialist moral philosophy judging the role and actions of human institutions based on their consequences, i.e. their tendency to maximise utility or welfare (Sen and Williams (1982) in (Alexander & Penalver, 2012)). The valuing of natural capital is somehow adding new factors in the very complex economic formulas of utilitarians and economic scientists, by making the measuring of alternative policies more complex, but also placing higher values on nature and other beings, therefore leading towards their protection (Goulder & Kennedy, 2011). Subsequently, this may also influence the way, or the normative justification that the society uses today to allocate rights to [material] resources (Alexander & Penalver, 2012). In the utilitarian theory this is done through the definition of the utility as human satisfaction and the designation of the purpose of the theory / of the human society as to maximise its aggregate net utility. The theory has its drawbacks with maximisation tending to continue endlessly and equity and ethics not being a factor in the equation because of being considered "subjective and therefore not amenable to rational analysis" (Douglas Amy (1984, 575) in (Raymond, 2003)). In fact the starting point for utilitarian accounts is Hardin's Tragedy of the Commons leading to solutions that rely on strong private and sate institutions.

This is exactly where the instrumental utilitarian values fail to address natural capital in its wholeness – the entirety of values attributed to natural resources as a factor in net welfare. The services that ecosystems provide are various and multidimensional. There are services of direct use/consumption, where the rational choice of individuals based on maximisation of value, can appear in the calculation of value according to personal preferences (Raymond, 2003). However, there is also a large pool of services, which may be of indirect use; or could be simply a potential that enables human and other species existence; or services humans/individuals/communities benefit from externally. Furthermore, while [property] rights on natural resources may be assigned to specific individuals, communities, or states, their services impact or benefit larger groups than those having the rights. This context becomes further complex when

thinking of other groups that have no rights at all on certain natural resources – at least from a legal system perspective, but with their benefit maximisation actions taking place in other locations, have an impact (negative or positive) on these natural resources. In these circumstances of social-spatial-temporal complexity, values assigned to natural resources and their services are so much more than a mere reflection of utility enhancement or net benefit maximisation resulting from [individual] rational choices. These values account for moral and ethics, culture and ideology, happiness and freedom, self-accomplishment and "human flourishing". These are most probably very subjective, so hard to account for, and context-based, but unavoidable and with a huge impact in [political] decision-making. Furthermore, this large set of values and the multi-dimensional character of natural resources, shows that the allocation of rights on natural resources cannot be either an individual, or a state concern. In fact it appears laying between individual rights and societal rights, therefore requiring for a harmonized view and approach in rights allocation.

Hegel's theory [on property rights] provides a good account for "establishing a constitutive relationship between private property, personal identity and community" (Alexander & Penalver, 2012, p.65). In his personality theory of property (Alexander & Penalver, 2012) Hegel views human beings as with free will, but needing the property to connect to the external world and develop into a member of an ethical community (Raymond, 2003). Property and property rights define the relationship of the individual with other individuals/the community and vice-versa, and hence true individual freedom and self-realization is achieved within the existence of a healthy relationship and social consensus within the community. According Hegel, property rights once determined, may be modified in the interest of the common good/community, as long as this does not undermine the existence of the individual right itself (Alexander & Penalver, 2012) (Raymond, 2003).

This discussion highlights a critical fact: ecosystems, besides being crucial to humans' and to the planet`s wellbeing, constitute also objects of individual, community and public property. Therefore, contrasting interests and values define the way humans use ecosystems. The contrast exist within the same individual, for the perspective he takes while using/protecting a natural resource, as well as among the individuals and between the individual and the community. The above theoretical perspectives show that individuals may take rational decisions, or abide to a moral and ethical discussion.

This is affected by the type of rights they have or wish to have, by the system that assigns rights and the [philosophical] principles it refers to, the number and type of natural resources they own or have rights for, and their location vis-à-vis natural resources. A primary question arising is about how property/use rights are assigned to whom for ecosystem services? Property relations are already a complex issue in terms of allocation to an ecosystem as a whole, let alone to envisioning ecosystems both as a land (a unique property object) and as the entirety of their functions and services. How would the 'bundle of rights' metaphor apply to each ecosystem service? Should one in the first place even think at all to apply the bundle of rights to each service or to groups of services?

Furthermore, because people think of property rights on an ecosystem as property rights on a piece of non-urban land, the size and geographical boundaries of the ecosystem constitute a key dimension on how they envisage property and property rights. The physical boundaries frame the area where the holder can execute his rights and protect him from others taking his rights away – at least this is how the rights' holder perceives the physical boundaries, basing his reasoning on the general and simplistic thinking of property as an object to posses. This kind of thinking does not consider ecosystem services. The latter exceed the boundaries of the ecosystem that provides them – i.e. service benefiting areas do not match and often overpass the boundaries of service provision areas. In these circumstances, the discussion on [property] rights over natural resources raises a moral/ethical and utility concern that has a very complex spatial and temporal dimension – from the individual to the society and through the generations.

2.3 The challenge of scale for managing natural resources

As a conclusion to the discussion so far, ecosystem governance or ecosystem-based governance is multifaceted and complicated, as it requires integrated approaches and tools that cut across sectors and involve a broad array of stakeholders and interests. It is in fact an approach that aims at providing solutions for guaranteeing robust and sustainable socio-ecological systems (SES), which is a very hard task per se, due to the high complexity of SES.

Humans dynamically use territories and build their 'realities', often with minor or no concerns on the ecosystem`s needs. These missing harmonies produce parallel

realities, the humans' one and the ecosystems' one, resulting even into different territorial boundaries that do not correspond with one another, neither in terms of location/geographical designation, nor in terms of activities and services that happen within them. Because humans are however part of the ecosystem and highly depend on it, rather than parallel realities, this situation leads towards what Cleveland *et al*. (1996) define as scale mismatch between human rules and ecological realities (Low et al., 1999). This is due to both the complexity of interrelationships in an ecosystem and between humans and the ecosystem, and the yet poor knowledge of humans about this complexity.

Through running simple dynamic models, Low *et al*. (1999) define that "human resource-use systems interact non-linearly with ecosystem parameters", with "complex behaviours and subtle thresholds that are difficult to foresee" (Low *et al*., 1999, p.240). By emphasising the fact that larger ecosystems and SES are not merely the sum of smaller scale ones, they also state that though SES of a certain level may work in perfection, any possible aggregation on a higher level could probably result into SES failures. Furthermore, within the same level, while a system may function in a sustainable manner, or within harvesting limits, it might in fact be subsidizing another system (free rider dilemma) that has set higher limits (Low *et al.*, 1999) and is therefore benefiting from the mobility of resource units, or benefits that the ecosystem provides beyond its geographical location.

Avoiding the effects of scale mismatch is not an easy task for well-known reasons, falling within the lack of appropriate knowledge on the full array of dynamic and complex socio-ecological interactions. To start with, there is no full human awareness of the scale dependences of the ecosystem services (Grunewald *et al.*, 2015), therefore poorly integrating the latter into political decision-making happing at different governance levels. Furthermore, the dynamic development and continuous modifications happening to the land uses of the landscape impact ecosystem services and synergies between users and resources in often-unknown ways. Also, administrative boundaries representing governance levels do not coincide in the majority of the cases with ecosystem and landscape boundaries. This leads to fragmented and possibly competing and contradictory decision making on the same resource, or parts of the resource.

The study of the management of natural resources held in common at small scale, has

among others shown that usually (not always) a small-scale socio-ecological system is better, or more easily manageable if certain conditions are fulfilled, and certain characteristics of the respective institution exist. While the scale increases, the cases become more complex and more difficult in terms of achieving sustainability. Ostrom (1990) and latter on a large number of authors have studied the sustainability of the socio-ecological systems and their institutions. In this process they have observed the regularities that exist in common among the successful cases, and then analysed their existence in the unsuccessful cases. The vast majority of cases and studies represent the small scale systems and there is limited research currently[3] taking place on the large-scale systems. Fleischman *et al*. (2014) argue that their "large-scale cases indicate multiple pathways to both success and failure that, in different contexts, are dependent on different configurations of variables. More broadly, the analysis of large-scale systems is constrained by a lack of examples of large-scale governance globally (as compared to empirical research on small-scale systems), and a dearth of research on some of the factors considered" (pp.452-53). Further to this argument, Nagendra and Ostrom (2012) by summarising Gibson *et al.* (2000) and Reed and Bruyneel (2009), state that though complexity of socio-ecological systems is not an aim per se and should not even be encouraged, it cannot go unnoticed and there is much to be learnt from the study of complex systems where diversity, complexity, and scale are considered as elements integral to the careful design of their appropriate governance (Nagendra & Ostrom, 2012).

While increasing the knowledge through further studies and scientific work is a must, continuous improvement and adaptation of governance models is also needed. The latter should acquire the state-of-the-art know-how on natural capital and ecosystem services, and in order to overcome as much as possible the gaps created by incomplete knowledge, should employ a feature of polycentrism or multi-tier approach, which among others addresses the impact of unceasingly differing scales, boundaries and spaces where nature's services are produced and related benefits are received or exploited. This is not a panacea, but remains a necessity, because the involvement of stakeholders (public and private) and the 'polycentric' use of their knowledge may help to overcome some of the problems created by the scale mismatch. It actually means that governance structures cannot operate separately on each level. They have

to cooperate among levels and actors and exchange related information and knowledge, while still retaining their independence.

Box 3. The watershed as an appropriate spatial scale for enhancing ecosystems governance in Albania

Ecosystem governance is as yet weak in Albania. In its endeavour to approximate environmental legislation to the EU legislation, in view of future EU membership, the Government has made good progress towards higher-level policies and law in the environment as a sector. However, the integration of environmental policies and legislation principles and instruments into the working routine of other sectors that use territorial resources (agriculture, territory planning, energy and mining, economic development, infrastructures, etc.) is far from being completed. One of the factors that make sectorial integration a difficult task is the poor coordination among government institutions, within and between levels (national and local). Because environmental objectives are crosscutting through sectors, institutions scope of work and instruments, rather than having institutions to cooperate in achieving them, a tension for fear of overlapping competencies is often visible, hence encumbering synergies. The lack of a regional governance system (either decentralised or deconcentrated) promotes further skew attitudes among institutions (Toto *et al*., 2014). In the last 10 years, there is a growing belief that probably a regional government regime established on a river basin level could help in increasing coordination and cooperation in several governance issues, and especially on addressing environmental concerns and policy objectives (Toto *et al*., 2014).

The proponents (Toto *et al*., 2014); (Toto *et al*., 2015); (Toto, 2010/a); (Toto, 2010/b); (Kuqi & Shutina, 2010) consider the river basin as a middle ground [regional] scale/space, where the two spatial scales (of local and large socio-ecological systems) can meet in harmony.

The river basin is a territory of several ecosystems working in a polycentric system, therefore functioning independently and all together being dependent parts of a larger independent organism (Heathcote, 2009). The proponents also list reasons for the relevance of integrated watershed governance and watershed as a regional governance territory, some of them practical rather than theoretical:

1. All types of territories (urban, rural, natural, agricultural) are integrated within a watershed, and thus all kind of human to human and human to environment

interactions are witnessed;

2. Several natural resources in a watershed are managed locally or through place-based practices and mechanisms. However their impact is felt within the watershed and further more on a global scale.
3. Several institutional actors interact for using and managing resources. There is an overlapping of political, social, economical and biological boundaries, which are governed through different institutions that need to cooperate efficiently;
4. Both government levels (local and central) have legal, though often conflicting competencies over areas, resources and services. The principle of subsidiarity cannot often be implemented because competencies are distributed among two levels only, without consideration for intermediary institutions;
5. The area is organized around the water body/ies, defining the natural space for human-nature interaction;
6. Ecosystem management criteria in land use planning can be easily used as the functional space would match the administrative and political one;
7. River basins are long discussed as the territory for regional planning and development in Albania, thus constituting an important unit of governance, development and planning.
8. The importance of the river basin performance increases tremendously in the light of climate change management practices;
9. The environmental and waters legislation in Albania define that public institutions should engage in preparing water[shed] management plans. The current planning processes also highlight the need for comprehensive and integrated regional planning, possibly at river-basin level.) (Toto *et al*., 2014).

There is however a significant criticism made to the idea of using the river basin as an appropriate space for regional and/or territorial governance, and that can be summarised as highly increased complexity of socio-ecological interrelationships (Keating, 1998); (DeBarry, 2004); (Heathcote, 2009). This is not a factor to be used against, but it strongly suggests that while voicing the advantages of the approach, it is inevitably necessarily to study and analyse the conditions and effects of this large-scale approach for the robustness and thus sustainability of socio-ecological systems.

2.4 The Objectives of the research and further

This above concise overview on the state of affairs regarding human-environment interactions so far reveals a number of *gaps* that require attention from academic, research and also a policy-making perspective:

1. Humans have become a dominant factor in human – environmental interactions and this leads to a loss of ecosystems balance. In order to avoid it, it is necessary to develop more in-depth and comprehensive knowledge on ecosystems, their functions and the services these render to humanity, and transfer this knowledge to policymaking and planning decisions, therefore to governance. Linking policymaking and planning with ecosystem governance is still far from complete, in terms of both thorough studies and practical cases of implementation. National governments employ the size (area and population), and the urban services of municipalities, as criteria for the allocation of intergovernmental transfers. There is hardly any recognition of other services that a territory provides, such as the environmental ones. As a result, most of the national grants go to the urban areas, instead of considering the valuable ecological services that a rural area (with its natural and agricultural land) provides to the citizens.

Rural, remote and sub-urban areas provide a variety of services for cities (drinking water, recreational spaces, water purification, mitigation of climate change effect, air purification, areas for water and flood retention, protection from erosion, etc.) that are not accounted for in the national systems of intergovernmental transfers (Ring & Mewes, 2015). Furthermore, spatial planning, though being comprehensive by nature and having evolved significantly in terms of employing a large body of environmental analysis and environmental assessment instruments, has not yet identified an appropriate way for including ecosystem services evaluation as a fundamental criterion in political decision-making. "A comprehensive method approved in practice for the integration of ES into the landscape plan has to date been outlined only rudimentarily, if at all" (Grünwald & Wende, 2015).

2. Sustainable development is said to be a goal of humanity, but it is not a well-known and fixed state of harmony that people are aiming at. On the contrary, a major dilemma of sustainable development is the uncertainty it has to deal with and the only way to address it is through the establishment of resilient systems, both from an

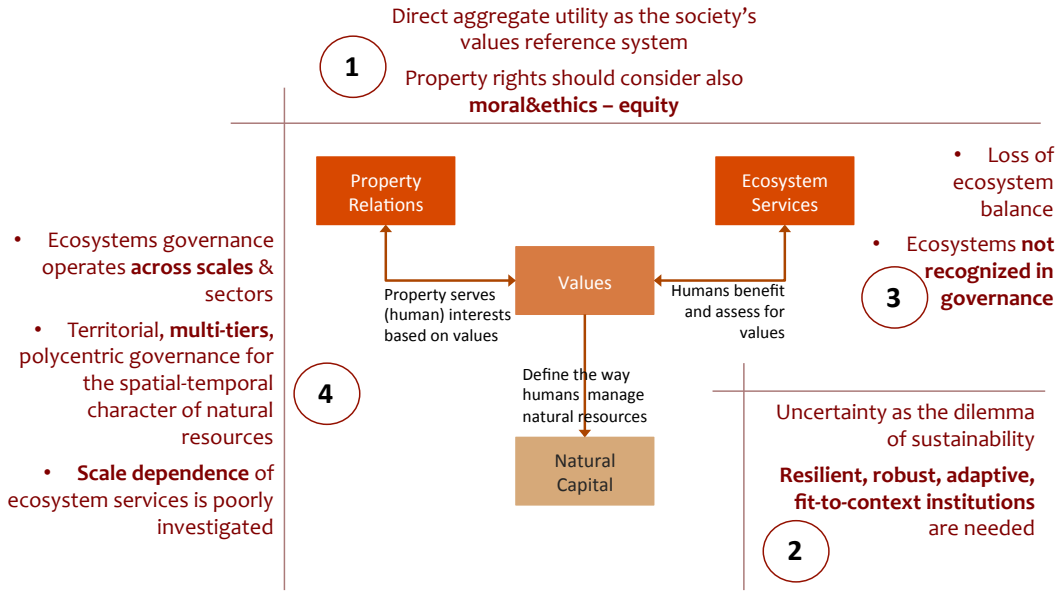
ecological and social-economic perspective. There appears to be consent among authors, on a theoretical level, that in order to achieve sustainability we need resilient institutions and governance mechanisms – robust and adaptive to change. The response is not a diatomic choice – thus either the individual level, or the government level. We need institutions that are able to fit to contexts, work well on a community level, protect individuals' interests and generate benefits for the community, as well as exceed the small community scale. So far, commons' regimes show ability to generate efficiency, social equity and ecological sustainability (Barnes *et al*., 2017) at the small common pool resource scale. There has been abundant research in this direction and several scholars have contributed to a growing stronger theory of common pool resources (CPR) and collective action. However, most of the environmental problems – therefore sustainable development problems, affect large-to-global-scale resources. While research on commons' regimes at small scale is already solid, the research of larger scale CPRs, or effects of CPRs' lessons on a larger scale is still incomplete.

3. There is a growing body of research, literature and even instruments on the governance of natural resources through an ecosystems services evaluation perspective. A number of values are assigned to ecosystem services in order to calculate their total economic value. The question is what kind of values' reference system is the society employing – thus where in the 'direct utility – moral&ethics' scale do we place our decisions about how to value ecosystems services and how to account for them in the political discussion and governance decision-making? The response defers us to the need to designate a system of [property] rights on natural resources that has an all-encompassing consideration of the pool of values and tends to move away from a merely utilitarian approach. This clearly cannot be one of private property alone or state property alone; it has to be a system where individual rights and concerns exist in harmony with community rights and values, such as commons' regime. Not all governments make meaningful efforts in this regard and it is necessary to promote these systems, which traditionally exist within communities but need promotion and consolidation support, in order not to remain divergent with conventional governance systems and feed their successes at a larger scale of ecosystem governance.

4. Ecosystem governance operates across scales and sectors. This is an important understanding but also a challenge to governments, policy scientists and researchers. Territorial and multi-levels governance is deemed to be the way for addressing the spatial-temporal nature of natural resources. One of the issues it has to deal with is the scale and boundaries of natural resources. The existing research on scale is very helpful in understanding boundaries (not merely physical), though as Grunewald *et al*. (2015) defines by referring to MEA (2005) and Hein *et al*. (2006) the scale (time and space) dependence of ecosystem services is a rather poorly investigated aspect. "There are significant deficits in knowledge and many open questions concerning spatial aspects of ecosystem services, the latter being always linked to space and time. This issue is addressed repeatedly in the literature, but so far relatively few operationalized and systematised in terms of conceptual and methodological aspects (e.g. Hein *et al*. 2006; Bastian *et al*. 2012a)". The discussion on scale and boundaries is highly relevant to ecosystem governance because it impacts right away the level and territory, where each institution (regardless of its status) has the competency to operate, and it also helps to address the 'ethics&morality – utility' values' dilemma.

The relationship between the issues that follow the definition of the problem and are summarised in the above gaps is shown graphically in the following diagram. Values constitute the core of these relations, by bringing together property and ecosystem services as two aspects of and approaches for managing the natural capital. These two approaches may contradict one-another, or coexist in harmony. The latter is required for sustainable development to be accomplished.

Figure 1. The interdependence of the concepts in the social-ecological systems and research gaps - the central role of Values



In the view of the state of affairs so far and the above gaps, the following research *intends* to contribute to the sustainable planning and management of natural resources from a wide perspective of the Common Property theory. On a *general objective level*, it focuses on common pool resources (CPR) and collective action, particularly on forests as one of the most controversial natural CPRs for the value they generate across scales (local-to-global) and the contribution on sustainable development (healthy ecosystems for current and future generations). Natural resources are of a common pool character because of being accessible and depletable.

There is now a wide recognition that local communities can successfully manage common pool resources (Ostrom, 1990); (Ostrom, 1999); (Ostrom, 2009a); (Ostrom, 2009b). However, this form of governance is situated in a traditional context of public and private actors that govern through state regulations and private property rights, while dealing with globalization effects.

On a *specific objective level*, this research will look upon management of forests in Albania, by analysing the opportunity and challenges for successfully linking the implementation of a commons' regime in forests with ecosystem-based governance for forests and drawing conclusions that can feed the larger scale current (conventional) governance framework in favour of sustainability.

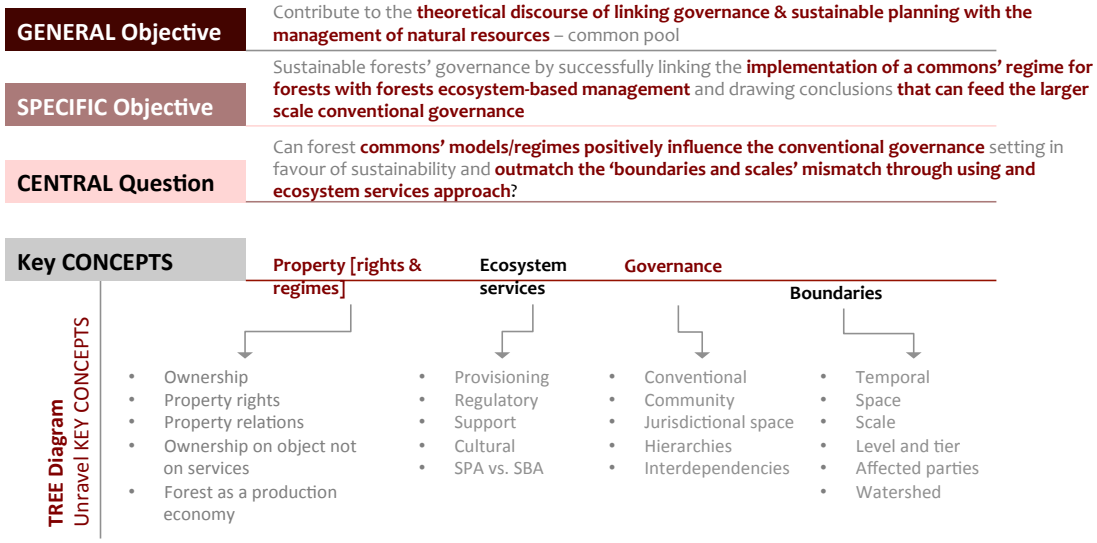
Based on this specific objective, the *central question* of the research is: Can forest commons' models/regimes positively influence the conventional governance setting

in favour of sustainability and outmatch the 'boundaries and scales' mismatch through using an ecosystem services approach?

There are a number of key concepts in this objective that need unravelling in order to lead towards the final focus of the research. The unravelling of the key concepts at this stage is also necessary to lead towards a deeper theoretical review for these concepts, in consistency with the research objective and central question and for the sake of this research. Considering the gaps identified above, the research will study planning for and management of natural resources, (i.e. forests) through an integral and comprehensive approach that falls under four pillars (key concepts), namely:

- Property [rights and regimes];
- Ecosystem services;
- Governance;
- Boundaries

Figure 2. Conceptual diagram of the research focus



The *property* pillar deals with management of forests based on ownership and property rights and relations. It raises questions regarding who owns the forests and what are the involved property rights and relations; what kind of property theories stand at the basis of rights' allocation on forest use; which institutions carry out forests management, how do they interact among them and what is the legal framework that supports their role and interaction based on the rights they have. Where does the common property regime stand in the large array of property models and relations? Of course property relations may differ upon the context, the property

system, cultural issues, and institutional and legal frameworks. However, a common denominator in the property pillar remains the sectorial (not cross-sectorial) perspective – thus the forest as a productive economy focusing mainly on the provisioning ecosystem services, and with the ownership on the object (not on services) as the key factor in defining how the forest can be used. The sectorial and administrative competencies on forests define the physical boundaries of study.

The *ecosystem services* pillar looks upon services that [a forest as] an ecosystem provides to its users and includes the complete multitude of [forest] services, i.e. provisioning, regulatory, supporting and cultural ones. This pillar is based on the functions that the forest as a complex ecosystem carries out, as well as on the array of those who directly or indirectly benefit, or are affected from forest's services. Two major implications arise in this pillar:

i) The forest provides a broad range of ecosystem services that are closely interlinked and quite complex (Gibson *et al*., 2000/a); (Gibson *et al*., 2000/b). The use of some of these services is rather direct, such as most of the provisioning or cultural services, while some other processes are less known to the end-user because of being relatively indirect, i.e. several regulating and support services (Daily *et al*., 2011). In these circumstances, managing a system of dynamic multiple services is a complicated task and requires enormous and systematic all-encompassing knowledge.

ii) ii) The physical boundaries of study and management are hard to define because those who benefit from or are affected by the multiple ecosystem services are many and sparsely located (Grunewald & Bastian, 2015b); (Grunewald *et al*., 2015); (DeBarry, 2004). The group of beneficiaries is also dynamic, thus differing per service and in time. For instance, those that harvest the forest products may live in the nearby villages, or anywhere in the country and the group is not constant over time. Those who enjoy the quality of a forest's landscape may live anywhere in the world, while those who live downstream the watershed benefit from water purification that an upstream forest provides, regardless of the ownership arrangement and property rights. Identifying and mapping the physical boundaries of the multiple forest's services impacts becomes thus very

difficult and nearly impossible. A way for doing so is by tracking markets of benefits from forests, next to the full flow of the service/s. However, in general, only few of these benefits enter the formal markets and most of them are either traded in informal markets, or do not enter markets at all (Pejovich, 1990); (Raymond, 2003); (Merlo & Croitoru, 2005a). Market failures can result from the lack of clear and enforceable property rights over forests and their benefits (Merlo & Croitoru, 2005a) as well as from the merely technical difficulty of tracking one-to-one relationships between a benefit or service flow and each possible beneficiary, or impact bearer.

The *governance* pillar is in fact closely interlinked to the previous two and it could as well be considered as crosscutting. However, as forests governance is embedded into the larger national governance frame, it needs separate attention. This pillar deals with the description and analysis of the institutions, being private or public, which govern forests in the conventional governance setting and their interaction with the commons' regime as an alternative governance model. It discuses planning processes and management practices, interests, institutional mechanisms, roles and responsibilities, institutional failures and successes, as well as the current impact of the governance setting (traditional or not) on the sustainability of forest ecosystems. The boundaries are defined by the scale and jurisdiction of government's institutions as well as by the property rights that the institutions hold. Furthermore, governance is also a concept in evolution, with dilemmas such as multi-layers/levels versus hierarchies, interdependencies versus antagonism, networking and openness versus authoritarian and populism approaches, local versus global. As a result, discussing the commons as an alternative, thus viable governance model in such an evolving context is both refreshing and challenging.

In all of the above three pillars, *boundaries* come out as a key component of the analysis, therefore constituting a fourth pillar. It is in the intention of this research to study the boundaries, first because it is an essential element of analysis for CPR institutions and second, because of the assumption taken by the research that 'commons as a viable governance model and ecosystem based' can positively influence the conventional governance setting. Assuming that one model can positively affect the other, it means that good practices from the 'commons' model

can feed valuable input into the conventional model for altering it to enable sustainability. However, the operational scope for both models is different time wise, spatially and in terms of costs and benefits, stakeholders and constituencies. For simplicity, this operational scope is named 'boundaries'. This gives boundaries a larger meaning than what the CPR literature employs (Agrawal, 2003); (Ostrom, 2009b). For the sake of this research, the boundaries constitute a multi-dimensional concept, that impacts the type and quality of governance and vice versa, the governance model impacts the boundaries. Therefore, the boundaries should be understood in terms of time, the affected parties, space, scale, levels and layers.

In order to unravel the terms composing 'boundaries' as a concept, reference is made to Green *et al*. (2005) regarding the 4-dimensional studies on land-cover change and Gibson *et al.* (2000) on the concept of scale and human dimensions of global change. Green *et al*. (2005) state that most of the phenomenology of land-cover change is thought to exist within the four dimensions of space and time, where space has three dimensions and time is linear and varies along one dimension (Green *et al*., 2005). Different disciplines and studies put the focus on space or on time, or alternate among the two. It actually shows that the complexity of studying land-cover change is not only high, but also a variable of the focus of the study. In any case, because socio-ecological systems are so complex, all four dimensions of Green *et al.* (2005) are subject to synchronised exploration.

Gibson *et al*. (2000) describes 4 theoretical aspects related to scale, namely: 1) level of interest of study, extent and resolution – physical aspects; 2) the way in which the explanation of a social phenomenon varies across levels; 3) the possibility to apply and/or generalise findings of a certain level to another one; 4) the way processes can be optimized at particular points on a scale. (Gibson *et al*., 2000/b). Gibson *et al*. (2000) define scale as "the spatial, temporal quantitative or analytical dimensions used to measure and study any phenomenon. Most importantly, they make a distinction between scale and level, which are often used interchangeably, by defining level as "the units of analysis that are located as the same position on scale". Starting from these definitions, the following unravelling of the "boundaries" concept is adapted for this research.

By 'time' is meant the period/endurance of impact, including the discounting factor – short term, long term, or both. For the sake of this research, the analysis of time as a

limit, involves thus sustainability and the value of a choice, or values affecting the choice. The sustainability discourse implies by definition that any mechanism or behaviour should make sure that "it meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). Values differ in time, in quantitative and ethical terms. This employs a values' analysis on philosophical basis as well as on economic terms. Economically, those who benefit or bear impacts discount values. The severity of the discount will depend on various factors (Ostrom, 1990) that involve long-term thinking versus short term one for each group of beneficiaries. While each governance model may in principle aim equally for sustainability and values, the respective actors are different and follow different systems of rules (i.e. institutions), including the corresponding institutional structures, therefore resulting in different outcome.

For the purpose of this research, 'the affected parties' comprise whoever has a certain implication, benefits, or bears an impact, voluntarily or not, in the process of forest management. This happens because of the particular involvement that each affected one can have, her/his location and the belonging institutional system. The affected parties have thus a physical dimension – their location vis-à-vis the ecosystem and its services, and a social dimension that includes their roles and duties (beneficiaries, impact bearers, caretakers, etc.), rights (for instance property rights), and institutional regimes that organise the previous. In both, the conventional and commons' governance models, the primary affected are humans, be those owners of the forest, (possible) users, or interested parties.

The forest management is based mainly on anthropocentric values, with humans as the ultimate target of public policies. There is nowadays a raising tendency, mainly on an academic or theoretical discussion level, to move from a merely anthropocentric thinking towards a biocentric one. Managing the forest as an ecosystem of multiple services versus a merely timber production economy, is evidence to increasing the scope of 'the affected'. Referring to Kareiva *et. al*. 2011, this means that value (derived in forest management) does not consist simply in the ability to give utility (or well-being) to humans, but in the ability to provide well-being to humans and to other species. The well-being of other species counts in the anthropocentric approach as well, but only indirectly, being important to the extent that it contributes to humans.

In contrast, the biocentric approach gives weight directly to the well being of other species (Kareiva *et al.*, 2011).

Boundaries as 'space' or 'extent' are very straightforward and should be understood in relation to the other dimensions. For instance, if the forest is considered as a timber production economy, then space consists of the territory where the forest is geographically located. If all forest ecological services were subject to management, then space would include also territories where each service extends its impact. In this case, space should not be thought of as simply a physical territory, but also in terms of distances that services 'cross' to reach the affected (Grunewald *et al.*, 2015). The latter may be sparsely located and outside of the territory where the ecological service is produced. Think of people living downstream a river valley and benefitting from water purification that a specific forest located upstream provides.

In a commons regime, the space consists of the communally owned land/resource, while in the conventional governance model the space consists of all those pieces of land/resources, i.e. forests that are under the jurisdiction of the government. The space discussion is critical for the assumption of this research, because space is substantially different in each governance model. The first difference stands in size: commonly owned space is usually very small (Kluvánková & Gezik, 2016); (Ostrom, 2009b) compared to jurisdictional space. The previous is defined by the edges of the related natural resource and the owners. The latter is determined based on a policy resolution and corresponds with either administrative or political boundaries. Thus, if a conventional governance model has to learn from a commons' regime, this does not insinuate that technically bridging between one set of boundaries to another is merely implicit, as if space did not matter. As a matter of fact, it suggests that the whole process should entail thinking on the appropriate physical space for governing commons within a conventional governance setting. This is a new type of space that naturally embodies some if not all of the characteristics of commons and is noticeably accepted as a politically administrative territory.

By 'scale' and 'levels' (for the sake of this research), is meant the government type, entity, organization, and the respective hierarchical level that is officially responsible for managing a forest. Within each level a small and large scale can be identified. For instance at the local government level there is the small community scale of forest management and the larger forest scale managed by the municipality. In the case of a

commons regime, related institutions are closely linked to the communally owned forest and consist of self-organised group/s of appropriators who devise, apply and monitor their own rules to control the use of their CPR (Ostrom, 1990).

In the conventional governance model, institutions, belonging to the state, govern the natural resources as public goods and have various responsibilities that depend on their jurisdictions. For instance, local governments and/or national spatial planning institutions take spatial planning decisions for the territories where the forests are located; a ministry of environment and/or biodiversity agencies (national or regional) follow up and implement conservation policies and instruments, taking care mainly of the environmentally protected areas/forests, and biodiversity and rare and endangered species within an ecosystem/forest; another ministry and/or state agency is responsible on managing the forestry sector, regardless of its biodiversity values and focusing mainly in the protection of forests and forestation (Primmer & Furman, 2012). In this case, the term 'scale' coincides with the concept of the exclusive hierarchy as summarised by Gibson *et al.* (2000), based on other authors (Turner *et al.* 1989; Mayr 1982; Allen and Hoekstra 1992) as "groups of objects or processes that are ranked as lower in a hierarchy are not contained in or subdivision groups that are ranked as higher in system" (Gibson *et al.*, 2000/b).

'Layers' is a rather abstract notion that this research would like to introduce. It aims at integrating the other dimensions of the boundaries into layers of information and analysis. For instance, the levels of conventional governance are rather hierarchical, but cooperation between two levels (local government and state agency with for instance jurisdiction on spatial planning and forestry sector respectively), together with a local community group (interested on sustainably harvesting the forest) and a group of scientists and academics (interested on various ecosystems services that the forest provides) forms a layer of governance for a given forest. Layers are simpler to imagine and analyse in a commons' regime and become more complex in a conventional governance model. This is so mainly due to the other dimensions of boundaries as described above. One could expect that this level of complexity increases further, if the assumption made by this research is true, since new or revised governance mentality is expected to infer. Furthermore, the term 'layer' tries to bring together multi-levels territorial governance and polycentric governance (as explained latter in the theoretical discussion). Hence, the research will often use the term 'multi-

layers governance' to understand the combination of the multi-levels with territorial and polycentric.

Besides exploring the above concepts from a theoretical perspective, this research will also investigate them in the Albanian case. It will initially shed light on how forest governance takes place in Albania, focusing on the system, the legal basis and its institutions. Then a study of the 8 design principles for robust property-rights institutions of Elinor Ostrom will follow, in order to understand the features of a forest commons' regime and how the conventional governances model is currently interacting with it. Further, for a closer look and corroboration of the 'boundaries' concept as explained above, the focus will be on the forests in the Shkumbini river basin.

The choice of the river basin as an intermediate and bridging space between the national and local territory comes for the following key reason: The discussion on boundaries, necessitates a limit of study, especially when the purpose of the research is to see if local small scale commons' arrangements prove true or helpful at a larger scale and territory. Pragmatically speaking, this limit cannot be simply one communally owned/managed forest, neither a municipality/government territory with 'artificially' designated administrative boundaries. There is a need to understand whether there are institutions or rules that work at a larger scale (Fleischman *et al.*, 2014/a); (Fleischman et al., 2014/b) than that of a single common and of the municipality, and if this larger scale is a functional one in terms of ecosystems. The river basin, or the macro watershed, is an appropriate starting space for initial data gathering and for the institutional analysis. Of course this is not suggesting that the research objective should by definition prove true at the river basin level. However, the corroboration of the research assumption will also entail results on boundaries, the latter exceeding those of one common pool resource. Because the boundaries are unknown at this stage, then the upper limit or the area of study is set to be the river basin.

Furthermore, as it will be described in detail below, the municipalities and any other public agencies managing forests outspread their authorities over both, converging and diverging geographical locations, with several overlaps. These boundaries are politically defined (Shutina *et al*., 2016); (Toto, 2010/b); (Toto *et al*., 2014), or as it might often appear in the text, artificially designated. The term 'artificially' is

emphasized to indicate that there is representation antagonism between the administrative boundaries and those of the naturally defined region – the river basin. A river basin area is defined by the water system (Heathcote, 2009); (Brooks *et al*., 2012) and comprises a multitude of ecosystems and common pool resources (Jagir & Eswaran, 2000). Housing the full array of ecosystem services as well as their interdependencies that extend to natural and urban territories, a river basin becomes highly complex in terms of human-environment interactions, or differently put socio-ecological relationships and systems, and therefore in terms of natural resources management/governance. The basin therefore constitutes a macro space for integrated commons' management (Kluvankova *et al*., 2015).

Other reasons for putting emphasis on the geographical area of study and on the boundaries as a concept are of a local (Albanian) character. Due to socio-economic and historical developments, Albania is in a continuous process of territorial transformation and governance reform since 27 years. Regardless of efforts and political processes, there is yet no final resolution, which leaves grounds for in-depth governance research, aiming at integrating territorial governance with sectorial governance into multi-levels territorial governance (Shutina *et al.*, 2016). The commons' regime and the ecosystem-based governance are of a territorial character and are very weak if not absent nowadays-in Albania (Toto, 2017); on the other hand, conventional Albanian forests' management falls under sectorial governance (GoA, 2005). Thus, besides aiming at contributing to the broad theoretical discourse on forests governance from a common property theory perspective, this research is also aiming at providing recommendations for the internal policy processes on governance reforms.

As summary to this chapter, by achieving its specific objective, the research of this thesis intends to provide contribution the following:

1. Contribute to the commons' theory, by focussing on the discussion of the issue of large-scale commons, or large scale for commons, and joining the current international efforts on empirical observations of these cases – how can lessons and design principles from small scale CPR prove successful or help for the management of large-scale CPRs;
2. Contribute to the ecosystem services theory by focusing on the discussion on scale and boundaries for ecosystem services management;

3. Contribute indirectly to the theory of multi-levels and territorial governance. Though this is not a direct focus of this research, the achievement of the purpose of this thesis provides input to the large body of research on territorial governance. It does so by discussing several of the territorial governance aspects for one given issue – the ecosystem-based governance of forests (natural resources);
4. Contribute to the commons' theory, through completing further the international repository of cases on typologies of forest commons, by adding the case of Albania;
5. Contribute to the efforts being made to operationalize the role of ES valuation in ecosystem governance and planning;
6. Provides recommendations that are of benefit to the Albanian policy context on territorial development and ecosystem based governance for forests;

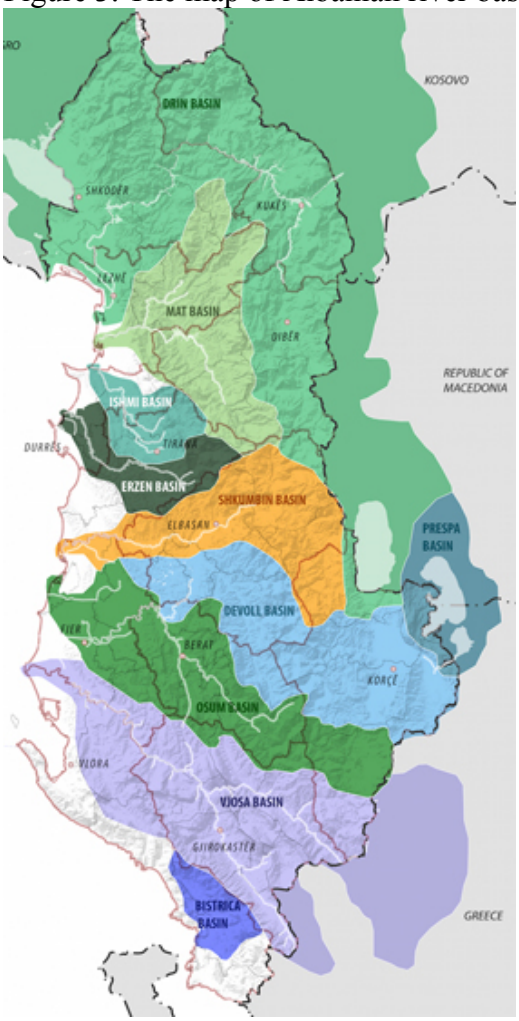
2.5 Research methodology explained

This section describes methodological aspects in general. The methodological details are provided in section 3.5. The latter contains the logical frame of the study with further methodological details that come after the completion of the theoretical discussion in chapter 3.

Geographically, the watershed that is object to this research is the basin of the river Shkumbin in Albania. The discussion on the CPR system for forests provides a profile on the national level, but then the explored cases are within municipalities that compose Shkumbini river basin.

The two main sources of the river are the Valamares and Shebenik mountains in the east and southeast of Albania. The river is 181 km long and it has a catchment area of 2,441 km^2. The average flow is 61.5 m3/s. The river divides Albania in two almost equal parts (significantly important for historical studies about Albania) and it flows through important urban areas (Elbasan, Peqin/Rrogozhinë, etc.) Its catchment area consists of mountainous parts, hilly areas, urban centers and rural and agricultural areas. It has a variety of natural resources, it is under the risk of high pollution (especially the urban and industrial pollution that originates in the area of Elbasan) and its delta is in one of the most beautiful parts of the coastal shore of Albania. The municipality of Elbasan has an area of 872 km^2 and a population of 141,714 residents[4].

Figure 3. The map of Albanian river basins



Source: Ministry of the Environment (2016); own visual adaptation

This research intends to apply a set of theoretical instruments to the Albanian case. These include the design principles of robust common pool resource institutions as well as other principles or variables that would apply to the larger scale. These principles and variables are the aspects upon which the forest commons' system will be analysed and all of the key concepts defined in section 2.4 will be materialised for the Albanian case. The selection of the design principles and variables comes on the basis of the theoretical discussion and therefore is provided in section 3.5. This section contains the logical frame for the study, resulting out of the theoretical review. Therefore, prior to engaging with the observation of CPRs (small and large scale) in Albania in the empirical chapter, a thorough overview will be provided in the theoretical discussion on the main theoretical concepts raised in this introductory chapter.

The work consists of the following main parts:

a) **Desk review** – theoretical review and analysis through using books and journal papers, as well as some website sources/documents; and gathering information and analysing the forest government system and legislation through using official government websites, projects' websites and documents, policy papers and studies, annual government monitoring reports, maps displayed online, statistical data from INSTAT (the Albanian Institute of Statistics), the Municipality of Elbasan, and Corine LULC for Albania. A complete list of the sources of information and literature is provided in the Bibliography chapter of this document. All sources are also cited in the text.

b) **Fieldwork** – for data collection and validation of information acquired through the desk review. This includes interviews and focus groups and visual site surveys as primary research tools. The formats of the interviews reflect the description made theoretically to the design principles and variables upon which the forest commons' system is assessed and analysed. The way these interviews are formulated is explained further in section 3.5 and the formats are provided in annexes no. 2 and 3. The selection of the interviewees is made in a way as to cover all of the forest commons' cases that exist within the basin. So, initially an identification of cases was made with the support of forest departments in each municipality. There has been no discrimination in selection and the latter is not sample-based. There are 2 municipalities in the lower basin that are not included in the interviews part of the fieldwork, because of not having forests.

   The interview is case-based and not informant/commoner – based. Hence, it intends to cover with information the case and not necessarily describe the specificities of each commoner. As a result, a shift between interviews and focus group discussion is allowed. This is also unavoidable because, depending on the area and cultural aspects of the community, often commoners prefer to come as a group, rather than be interviewed independently. However, in all cases, the interview collects also quantitative data about the commoners and explores individual concerns as a means for quantifying the profile of each case and for discovering case specificities that rest at individuals' level. Finally each interview was administered with forest

officials as well. All forest departments at local and national level were included in the process.

During the fieldwork, a questionnaire was also applied as a secondary tool of research. The purpose of this questionnaire was to generate local (Albanian) information and support the arguments on the ethical/moral-utility values discussion as raised earlier in this chapter and as it will follow in chapter 3. The application of this questionnaire supported the researcher in gaining a correct understanding of the 'values' concept and discussion for natural resources and ecosystem services. Therefore the questionnaire was about the know-how of the citizens on forest ecosystem services and their willingness to preserve and pay for these services. The contingent valuation method was used.

The questionnaire was applied in an urban forest for the following reasons: it is close to the researcher`s location thus easier to administer; the users have access rights only and benefit from the forest regardless of the distance between their location and the forest – hence helping in the better theoretical understanding of the boundaries concept. In these circumstances the forest ecosystem services are provided equally to all of them within the sub-watershed; the sub-watershed is pre-defined, i.e. there was no need for preliminary work to define the territorial scope of research. The focus was then placed on choosing the proper sample. 384 questionnaires were filled in, constituting a representative sample for the total population of Tirana (park users) of around 760,000 residents, with a confidence level of 95%, confidence interval of 5%. The questionnaires were administered every two days, including also one weekend day, in 6 entrances of the park, and the process lasted 5 weeks. A stratification was also made to define the share of people using each entrance versus the total of people using the park, and distribute frequencies for days of the week. The enumerators were trained before hand in order to acquire the same understanding on questions and avoid subjectivity in the interviewing process. The questionnaire format is also provided in annex no. 6. Again, it is necessary to highlight that the use of this questionnaire was of indirect interest to this research and it served to increasing the understanding of the researcher on the concept of the ecosystem

services values and the value system on natural resources. The questionnaire did not produce data as a response to the central question of this research.

Water quality tests constituted another secondary tool for collecting data on the Shkumbini river basin characterisation. Besides using water quality indicators published by the National Environmental Agency (NEA), the use of alternative data was considered as crosscheck and in order to collect more samples. 13 water quality biological parameters were surveyed in 11 river sections. Two sections were surveyed also for heavy metals (Pb, Cd, Mn, Ni, Cu, Zb, Co, Cr, Hg, As, Fe, Br). The NEA is currently not measuring heavy metals in river waters. The samples were collected during springtime and the assessment was made by a certified laboratory, using different ISO and complex methods. Annex 5 provides the parameters that were surveyed and the reference standards.

c) **Data processing** – in excel for the design principles and other criteria; in spss for the information retained by the questionnaire; in GIS for mapping and linking qualitative information with the territory and boundaries.

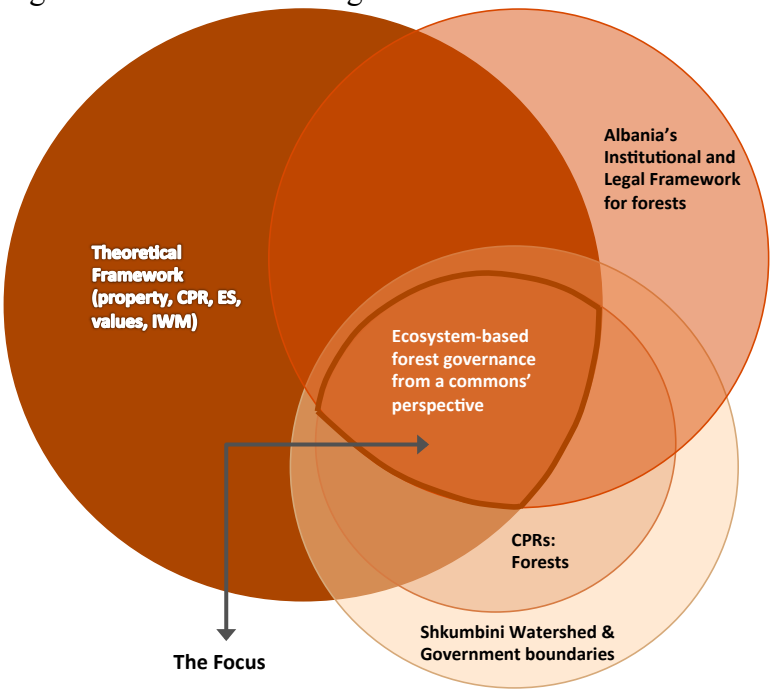
d) **Analysis –** the type of analysis is described in detailed in section 3.5, with the completion of the theoretical framework and final decisions on the methodological approach of the analysis. However, at this stage the analysis can be defined as having the following dimensions: theoretical analysis of the key concepts; analysis of the forest governance system – both conventional and commons' regimes; analysis of the forest ecosystem at river basin scale; discussion on the governance design principles and variables and on the boundaries concept.

e) **Confrontation with theory** – the theoretical discussion and analysis ends up with theoretical models and a list of design principles and variables against which the empirical part is completed. In conclusion to the empirical part, a reflection on the theoretical models used from the perspective of the analysis is made. Furthermore, the overall gaps summarised in section 2.4 as well as the central research objective and question are revisited, to assess the contribution of this research on a theoretical level and define future needs for research.

f) **Conclusions on the Albanian case** – besides confrontation with the theoretical models, the conclusions of the empirical discussion shed light on Albanian specificities of forest commons and conventional forest governance. These conclusions lead also towards recommendations that the Albanian government could employ with regard ecosystem-based forest governance.

The following diagram provides the main building blocks of this research from a content perspective and their relationships. The desk review is used to support the analysis of all building blocks, while the fieldwork and data processing contribute to the following blocks: 1) CPRs: forests; 2) Shkumbini watershed and government boundaries; 3) the ecosystem-based governance from a commons' perspective.

Figure 4. The main building blocks of the research



III. Theoretical review and critical discussion

3.1 Common-pool natural resources and their governance

The society cares about the commons, because it considers them as essential to its wealth and happiness, inheriting them from previous generations and protecting, maintaining and creating them for future generations (Anderies & Janssen, 2013). Rooted in the practices of millions of households around the world (Agrawal, 2003) commons' management is based on traditional and historical community knowledge and processes, existing since centuries within communities, which sustain their lives through the services provided by the natural capital.

Garret Hardin (1968) defined commons as open access, and on this basis predicted a tragedy of freedom on the commons, where each user would seek to rationally maximise his gain without limit, increasing the individual utility and sharing the effects of overharvesting, in a limited world (Hardin, 1968). Harding was not alone in making this reasoning; in fact he was not even the first. Over the course of 15 years (1954-1968) game theories developed on the dilemma of individual rationality against collective rationality and scholars, such as H. Scott Gordon, Anthony Scott and Mancur Olson argued that open access conditions over the natural resource lead towards destruction of the resource stock; and even if individuals have a shared goal on the resource use, they are unlikely to cooperate in achieving it (Schlager, 2004).

This kind of reasoning is still made by some theorists and even lawyers in the current days. For large-scale commons, where the risk of having open access is more prominent (due to large size, significant number of users and unaccounted beneficiaries), if an all-encompassing system of governance is not in place, the tragedy may as well happen. As a matter of fact, in many of these cases, while access to the resource per se and its tangible resource units may be well-determined, access to a number of intangible or indirect ecosystem services that the resource provides remains open. This does not mean that probably Hardin and others were right; it shows that significant resources that we share in common – and a classification of commons in terms of socio-biophysical boundaries size should take place – are at a great risk due to the complexity of human-ecosystem interactions portraying these resources and the limited knowledge the society has on this complexity.

While the contribution of "Hardin and colleagues" was essential in raising awareness on environmental resources, it also led toward two major problems: 1) they failed to recognise that commons (at least most of them) are not open access (as public properties are) and the shared management of natural commons on a local level existed since centuries as a traditional form of community-based governance; 2) as a result of their arguments becoming widespread and popular in economics and political economy disciplines, a robust belief grew that only strong central states, with expertise and resources are able and fit to manage and therefore avoid degradation of natural resources (Schlager, 2004). These problems are interlinked. Neglecting the previous created a neat arena for the second to bloom in governments' policies, strategies and forceful interventions. The domination of the state-cantered control and regulation policy paradigm (Schlager, 2004) placed community-based governance of natural resources in a hibernation status – at least for a while. This course of thoughts and actions was among others based on two notions prevailing in the first half of the 20th century and explaining the world as in a state of dichotomy. Thus, there exist two types of goods, which Paul Samuelson (1954) divided into public and private goods and two types of optimal organizational forms – the market as the optimal form for private goods and the state as the optimal form to govern public goods (Ostrom, 2009a).

However, after at least two decades of failures and dissatisfaction from the dominant policies and with many scholars identifying several successful small-scale cases of commons' governance (Schlager, 2004), an international endeavour (both on a governance and scientific level) on exploring, understanding and embracing practices of common-pool (natural) resources self-governance begun.

Referring to Agrawal (2002); Ostrom (1990); and McCay and Acheson (1987), and other researchers showed that informal forms and mechanisms of control and governance over common-pool resources (CPR) flourish in various setting worldwide and achieve successful results (Raymond, 2003). This myriad of cases and processes cannot go unnoticed – not simply because it reflects the reality, but especially for the notable governance lessons that the society and institutions can learn from. Elinor Ostrom, was one of the scientists who dedicated her scientific work to the study of commons self-governance, building and consolidating together with other scholars a theory of common-pool resources (CPR) and their sustainable governance. This

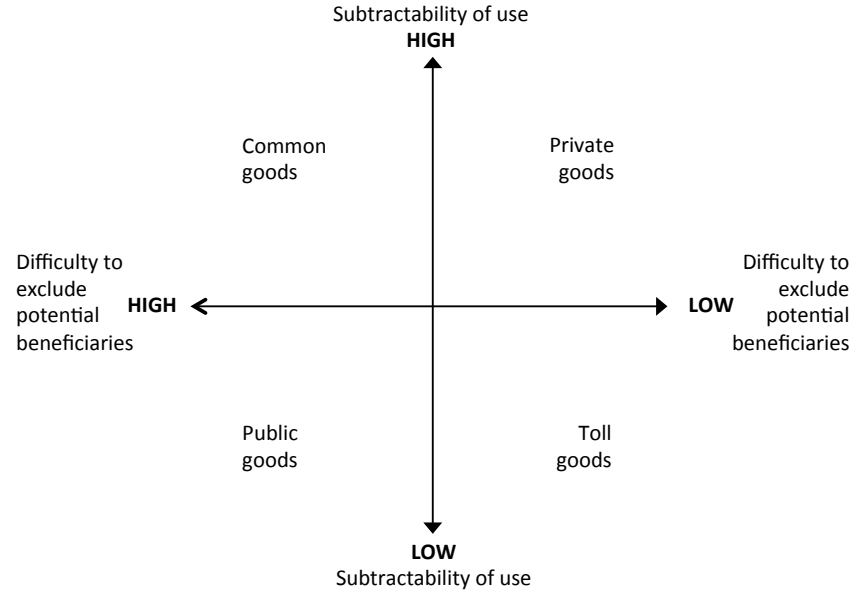
theory sheds light, but also opens discourse channels on a number of factors, such as: types of goods and property rights characterising CPRs; conditions to initiate and sustain a commons regime; common principles that stand in the design of successful and robust commons' institutions; the scale of commons and their related institutional success; and the understanding of ecosystem services that a common pool resource provides within its socio-ecological system.

When Garret Hardin (1968) defined freedom on the commons as ruin to all, he also raised the need for a redefinition on property rights (Hardin, 1968). To him, this redefinition of property rights was strictly related to the only two options to manage the "commons", avoid open access and arrange the property rights: either privatization of the resource, or government`s control. In this way, he neglected the fact that in traditional commons [regimes] there is no real freedom on the use of the resource and a set of rules on property rights allocation and management has always been in place (Anderies & Janssen, 2013). Again, he abided to the idea of two types of goods only: public and private. Public goods are nonexcludable (accessible) and nonsubtractable (previously called nonrivalrous), or as Ostrom (2005) revises, have a high level of difficulty to exclude people from consuming them and a low level of subtractability of use (i.e. security, fire protection, defence, etc.). Private goods on the other hand are highly subtractable and easily excludable (Ostrom, 2009a) (Ostrom, 1990).

Hardin's view was rather simplistic, as was his example. In the real life, a set of at least 4 known types of goods is present and their subsequent governance models are quite complex and have shown various degrees of successes and failures, dependant on several factors, often contextual. Buchanan (1965) added a new type of good – the club goods, which Ostrom and Ostrom (1977) revised in calling toll goods. These types of goods have both low subtractability of use and low level of difficulty to exclude others from using them (i.e. theatres, day care centres, etc.) (Ostrom, 2009a). If private and public goods are two opposites in terms of access and divisibility, toll goods stand as the opposite of the fourth type of goods – the common goods (figure 5). Common goods, such as fisheries, forests, groundwater basins, etc. are accessible, or with a very high exclusion cost and therefore high level of exclusion difficulty and highly divisible (subtractable) and therefore leading to overuse, congestion and depletion (Ostrom, 1990) (Ostrom, 2003) (Schlager, 2004). Natural resources and

ecosystems in general are common goods, regardless of whether the government owns and manages them (Ostrom, 2009a), and their scarcity and depletion beyond regeneration rates are key concerns of the sustainable development paradigm.

Figure 5. Types of Goods



Source: Adapted from Ostrom (2009a)

We – humans live in a world of scarcity (Pejovich, 1990), where uncontrolled use of [depletable] natural resources is a common and pressing environmental and economic problem (Raymond, 2003). Hence, thinking that natural resources are abundant and there will be no need for regulating their use is merely wishful thinking. While Hardin's view on types of goods and their management was incomplete, his call for a clear [re]definition of property rights and property in a resource-scarce world of constantly growing population remains as yet a valid subject, and certainly useful in property [rights and relations] management for natural resources.

Property rights are relations among humans, arising from the existence of [scarce] goods and pertaining to their use. This definition suggests two important facts: i) property rights should not be separated from human rights, and ii) property rights are relations between individuals (Pejovich, 1990). Paraphrasing Macpherson, 1978, Raymond (2003) "defines property as a social relationship giving an owner power over other individuals that restricts their control or use of an item or resources". This definition of property as a right and not a thing includes more intangible forms of property (Raymond, 2003). The modern lawyer's view of property is commonly referred as "the bundle of sticks, thus capturing valuable insight about the substantial

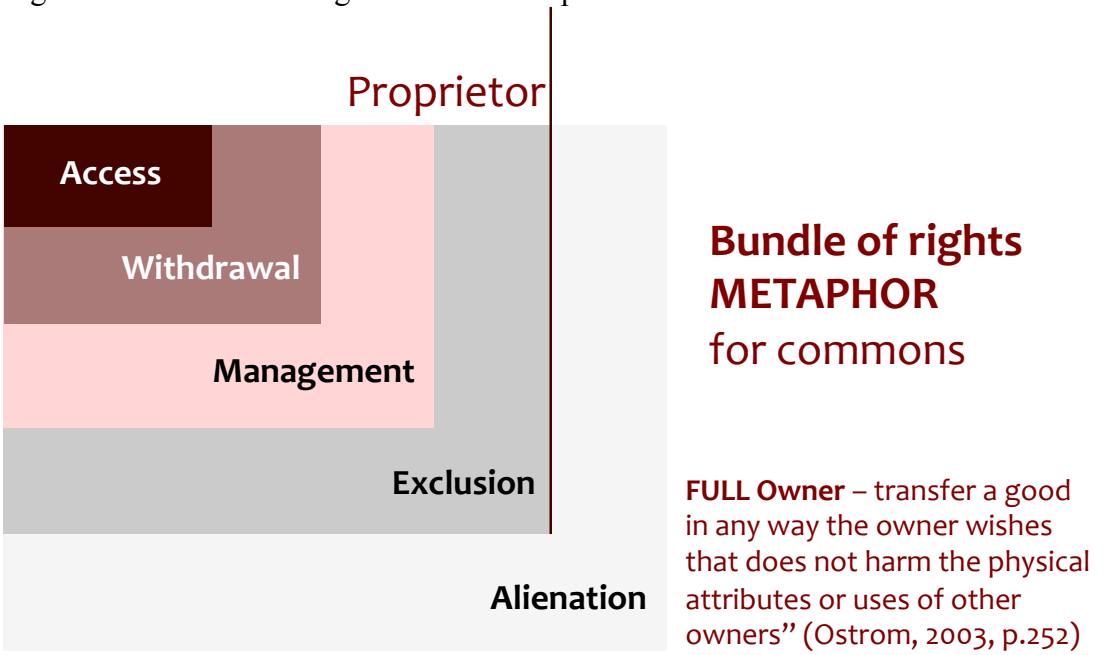
flexibility in the design of property institutions. However, taking this conception too far risks turning property into a disaggregated collection of narrowly defined rights, causing us to loose sight of the connection of those rights to the things" (Alexander & Penalver, 2012). Thus, the modern "bundle-of-rights" metaphor risks giving a weak sense of "the thingness" of property (Heller, 1999).

Different scholars and theorists have tried to overcome such a risk, by employing various other alternatives of treating and explaining property and property rights. Nevertheless they all conclude with bundling rights, focusing on all or few of them. Then, most of the discussion focuses on the nature of right – as a political creation (instrumentalist or possessory views) of the government, or prepolitical (a natural right, egalitarian view), and on the justification for allocating and redistributing it or not (Raymond, 2003), trying to explore the balance between the individual interests and collective goals. In this context, understanding "the thingness" of property for natural resources requires first clarity on the bundle of rights that best describes the position of the user towards the resource and towards other users/beneficiaries, and then clarity on the reasoning and general interests behind allocation of the property rights (Alexander & Penalver, 2012).

Elinor Ostrom and her collaborators defined a bundle of 5 types of rights for common pool natural resources, namely: access, withdrawal, management, exclusion and alienation. The user, which has the full set of rights is considered a full owner – besides having the other 4 rights, he has the "right to transfer a good in any way the owner wishes that does not harm the physical attributes or uses of other owners" (Ostrom, 2003, p.252). Some scholars presume that the existence of a right by one party to sell/transfer all of the rights on the property to some other party (alienation) is the only condition for being considered an owner (Ostrom, 2009b). The lack of alienation right does not however impede the user from benefiting from the resource. Elinor Ostrom develops a cumulative ladder-like profile for the user, based on the rights he possesses. Access to the resources, means being an authorised entrant; having the right of withdrawal of resource units, means being both an authorised entrant and authorised user; having the right to manage the resource means being an authorised entrant, user and claimant; those who can exclude others from entering, withdrawing resource units and managing the resource have an exclusion right and

are considered proprietors and possess all four rights simultaneously. (Ostrom, 1990) (Ostrom, 2003) (Ostrom, 2009b).

Figure 6. The bundle of rights for common pool natural resources



Source: Author, based on Ostrom (2003) and Ostrom (2009)

In the case of common pool natural resources, the above bundle of rights belongs – in full or partially to the community. It is usually the community that lives nearby the resource, whose welfare, living, and even survival has a direct link/dependency to the use of the natural resource. At least this is how historically the allocation of rights has taken place for most of the commons around the world. The question arising is why would these people choose a form of communal ownership – sharing property rights in common, rather than subdividing the resource and choose private ownership instead. Netting (1976, 1981) identified 5 attributes most conducive to the development of communal property rights [in grazing]: "low value of production per unit of area; high variance in the availability of resource units on any one parcel; low returns from intensification of investment; substantial economies of scale by utilizing a large area; substantial economies of scale in building infrastructures to utilize the large area" (Ostrom, 2003, p.254). Other factors derived from other studies include the importance of sharing the risk and therefore facing challenges from unpredictability (Ostrom, 2003). Furthermore, common ownership to resources is thought to enhance the security of tenure, especially in a context of high inequalities, continuous institutional change and fear of losing ownership (Bassett, 2007)

Next to these attributes which summarise the reasons for being embedded in a CPR regime rather than in private property regime, Ostrom (2003) summarises, by citing a large number of authors, also the attributes of participants/users that create conditions for a good performance of the CPR system. These attributes are: information on benefits, cots and the condition of the natural resource is available at low cost to all users; participants share the same understanding on costs and benefits of their actions; participants have an initial basis of social capital, where trust and reciprocity dominate; the users' group is relatively stable, homogenous and relatively small; participants apply very low discount rates because they see themselves and even their children as long-term related to the resource; participants make collective-choice arrangements an rules that avoid high transaction costs and high deprivation costs; participants are able to develop relatively low-cost monitoring and sanctioning (Ostrom, 2003, p.257)[5]. Furthermore, the manageability of the CPR depends on a number of factors such as: small spatial extent, well defined boundaries, possibilities of storage, predictability or resource flows, low level of mobility of the resource (Van Oel et al., 2009)

Beyond the studies on reasons to opt for shared property rights over natural resources, conditions for good performance of the CPR system and factors of CPR manageability, scholars engaged also in the understanding of features that make a CPR institutional system robust and sustainable. Elinor Ostrom observed and identified 8 general institutional regularities among robust commons' systems that she labelled "design principles" – 7 design principles plus a eighth one that is used in larger and more complex cases, all constituting conditions that help to account for the success of the institutions in sustaining CPRs (Ostrom, 1990). These principles are as follows:

1) well-defined boundaries: Individuals holding the rights are clearly defined and non-users identified. Their rights are clear. Cox, Arnold, VillaMayor-Tomás (2009) revise the principle to add also resource boundaries. In fact, in the case of an common pool ecosystem the boundaries are very complex and include: property rights, users and non-users, physical boundaries, time boundaries and impact bearers. The latter includes those that according to Alexander & Penalver (2012) have in rem[6] duties to owners. ;

2) proportional equivalence between benefits and costs: the principle involves congruence between benefits and costs as well as congruence between appropriation and provision rules and local social and environmental conditions (Ostrom, 1999) (Cox et al., 2010);

3) collective-choice arrangements: resource users – individuals having rights over the CPR participate in making and modifying rules about how to exercise use rights;

4) monitoring: this involves monitoring of the users appropriation and provision activities and the conditions of the natural resource – the CPR. Users themselves or individuals who are accountable to the users and the resource do the monitoring (Ostrom, 1999) (Cox *et al.*, 2010);

5) graduated sanctions: instead of a unique sanction, there is a pyramid of gradual sanctions effectuated upon the level of violation. "Sanctions for rule violations start very low but become stronger if a user repeatedly violates a rule" (Ostrom, 2009a, p.422) ;

6) conflict-resolution mechanisms: it involves actions to resolve conflicts among users of the CPR and between users and public officials;

7) minimal recognition of rights to organise: the government recognises the commons' regime and therefore the rights of the users to organise, use and manage the resource;

8) and nested enterprises (typically important in larger organisations): CPRs are often small, but several other cases are either large or related to other CPRs in a complex social-ecological system. In this case, governance activities take place within and beyond the specific CPR and organised in multiple nested layers (Ostrom, 2009b).

These principles help also to analyse social-ecological systems that are more complex than a single and relatively small CPR. In fact the first principle (*boundaries*) and the last one (*nested enterprises*) are key to moving from the observation and analysis of a small-scale CPR to a larger-scale one. The CPR *boundaries* as defined above have multiple dimensions: spatial, temporal, user rights-based, and impact bearers, all resulting from the large variety of ecosystem services provided by a CPR and the nature of the resource units. Schlager (2016) explains for instance how storage capacity (or stationarity) and mobility of resource units impact the behaviour and collective action of the resource users in the CPR. She highlights that resources users are more likely to develop stronger spatial and temporal restrictions on access and use

if the CPR is characterised by high mobility and lack of storage of resource units and continues further by saying that "in systems with high mobility, well defined boundaries of resource users, or design principle 1 appears necessary for success" (Schlager, 2016, p.408). Employing stronger rules provides an opportunity for users to increase control over the space, while control over units is limited. In fact, if we consider ecosystem services as resource units, then the "high mobility" feature will always be present in a CPR as a typical feature of ecosystems. This again leads to the understanding that ecosystem-based governance of commons is even more complex than a CPR theory would suggest, as it has to deal with multiple causes and effects, happening in one limited space, crossing over and integrating among them, and resulting into benefits or impacts for others who live outside of the primary space.

> *Silke Helfrich (in Ostrom 2011) writes: "Resources are free. They know neither property rights nor borders. Resources do not know if we need them to live or if we don't. We, however are tied in one way or another to these things: to limits, to ownership and – above all – to resources themselves… Everyone who belongs to a particular community and collectively uses its resources need to agree on how to share. But to agree on usage rules for resources and monitor their compliance is anything but child's play"* (Grunewald & Bastian, 2015b, p.28).

CPR theory develops around the conditions under which open access management of common-pool resources can be avoided through collective action. (Fleischman *et al*., 2014/a). However, while it provides a good answer to the sustainable development of the natural resources, it does not at the same time constitute a panacea for all commons (Barnes *et al*., 2017). One of the challenges that CPR theory alone cannot solve but can definitely help for are large-scale commons and in fact all of those cases where the understanding on boundaries increases to include the "unknown" boundaries of ecosystem services. The governance of the CPRs, successful or not, happens at different levels and it is not usually dealt with simply from a commons' regime. This is so because of the boundaries of the natural resources being both functional/natural and also artificial/defined by humans (i.e. property rights and administrative boundaries). As a result the number of users is different from that of beneficiaries. The latter can mount to global scale (for instance for forests) while the users represent a small local community attached by property and proximity to a common pool ecosystem. Therefore other actors, such as public bodies, non-

governmental ones, and the businesses, intervene in a way or another in the community management of the natural resource. This is unavoidable and it is not wrong, as long as the interventions take place properly, with good intentions and are implemented in a way as to respond to both, the local needs and to the higher level/tier needs.

In their study of community forests management, Barnes *et al.* (2017) identify three type of interventions that could be made to a common pool forest system: 1) interventions activities directed at forest institutions; 2) activities aimed at directly affecting capital stocks and strategy choices; 3) activities focused on strengthening or altering community institutions (Barnes *et al*., 2017). They make a differentiation between forest and community institutions, with the previous meaning CPR institutions and the latter meaning sustainable livelihood approach (SLA) institutions. The latter includes the first as well as other [community] institutions that are not concerned directly with the specific (forest) CPR management.

This discussion is important because the sustainable management of the CPR is not an isolated activity and neither a final goal per se. It is actually supposed to lead to community's sustainable development and livelihood and to the sustainability of the resource for the other generations and impact bearers outside of the community. According to Barnes *et al.* (2017) the interventions in community forest management are undertaken by a wide range of external stakeholders, be those government departments (at various levels), civil society organisations (CSOs and NGOs), activists and community based organisations (CBOs), and donors. While the community is responsible for crafting and implementing the rules in a CPR system, these external actors will play a role in increasing CPR users knowledge of harvesting techniques, risks of overharvesting, knowledge on forest maintenance activities and technologies, etc. Therefore the existence of the 8 design principles for robust CPRs would not be a sole factor in defining the success of the CPR system, because these external interventions play actually a crucial role in shaping the CPR institution and its capacities (Barnes *et al*., 2017).

The "explosion of boundaries" to embody so many dimensions and guarantee the resilience and sustainability of the system brings the analysis right away to the 8th principle – nested enterprise. In larger scale CPRs, management activities happen in multiple nested layers. These "cross-scale" or "multilevel" networks go beyond local

arrangements and involve horizontal and vertical connections between government agencies and other stakeholders, therefore establishing a networked form of governance where collective action occurs in multiple interconnected action situations at different levels and scales (Garcia-Lopez, 2013)[7]. It is on this basis that Garcia-Lopez (2013) analyses the function and impact of a unique form of multi-level governance in community forestry – the inter-community forest associations in Mexico. He explains how the associations provide benefits to members that improve the sustainability of community forestry, while also differentiating (in terms of outcome and success) between top-down (government-initiated) and bottom-up (self-organised) associations (Garcia-Lopez, 2013).

While describing the Mexican case of forest associations as a unique one in terms of creating "multi-level linkages connecting communities to each-other and to higher levels of governance" (Garcia-Lopez, 2013, p.409), he also emphasizes and provides ground for what a large number of authors have defined about the all-encompassing (ecological, economic, social and political) role of multi-level arrangements in community forestry: sharing of technical knowledge and information and instruments of cooperation make communities and their institutions adaptive to change and contributors in establishing social and ecological resilience; increase liveability; build trust among users and between users and institutions; and strengthen their ability to influence policies at higher orders in the governance hierarchies (Garcia-Lopez, 2013). This all leads to communities being better off, resources being kept safe and regenerated, and to more efficient governance models that are able to eliminate the negative effects of cross/overlapping-scales.

The above analysis provides two indications: 1) common pool natural resources, though embedded within their regimes, are subject to conventional governance as well. The latter intervenes into the CPR system and may either improve it or weaken it. As a matter of fact, as Berkes (2006) notes, the institutional arrangements of the CPR systems are "in reality multi-level and far from simple" (Armitage, 2008, p.14); 2) hence, the governance of ecosystems as common pool resources is subject to a multi-tier and polycentric governance. This type of governance is all-encompassing in terms of stakeholders and institutions – it involves all kind of actors at different levels. In governance literature this is known as multilevel [territorial] governance.

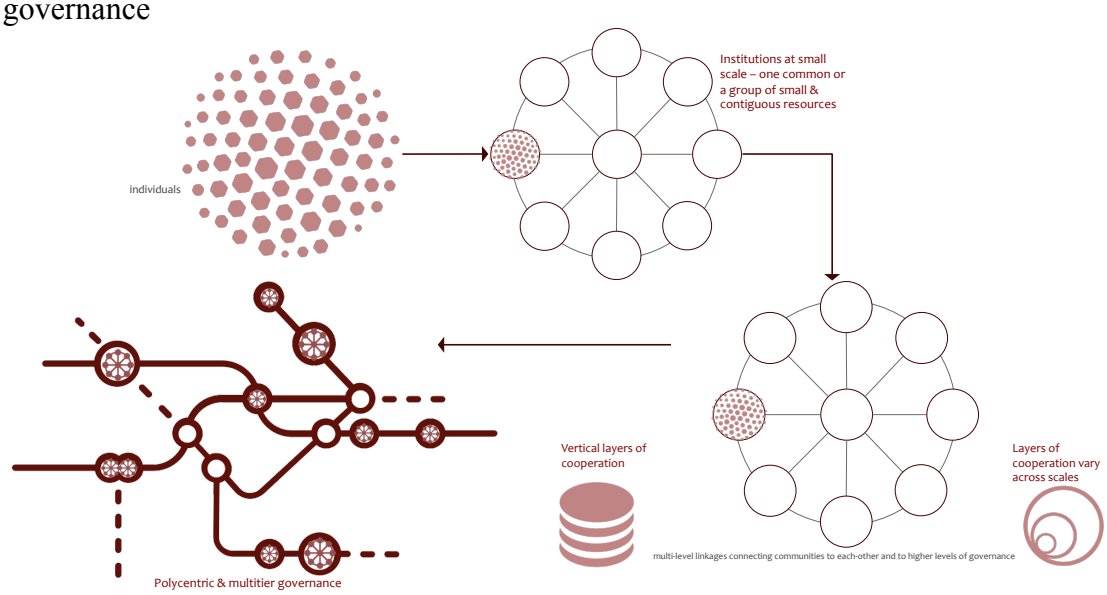
In this research, the terms multi-tier and polycentric will be used as a direct reference to the CPR theory and Elinor Ostrom contributions on the concept. The 'multi-tier' concept was shortly explained in section 2.4. "Polycentric connotes many centres of decision making that are formally independent of each other" as Elinor Ostrom (2009) refers to Vincent Ostrom, Charles Tiebout, and Robert Warren (1961) in her Nobel Prize lecture. In a multi-tier system, these centres operate interdependently. By combining horizontally and vertically levels of governance, institutions and actors operating at each level and among levels, it leads to the need to see how design principles of the CPR regime can be analysed from a conventional and/or multi-tier governance perspective, and whether there are other principles/criteria/aspects to be included as we move to this higher level. Furthermore, are there institutions or arrangements that can bridge between both forms of governance (CPR regime and conventional one) and how can the multi-tier governance support synergies between both forms?

The multitier system can adopt those features that a convention top-down form of government hardly can, such as: adaptability and ability to cope [timely] with uncertainty, flexibility, response to change, learning, cooperation and communication. Hence the multitier system is a resilient one and can contribute to the achievement of sustainable development goals. As Armitage (2008) summarises from a number of authors, this system is also interactive and dynamic, can ensure accountability versus the stakeholders, has visionary leadership, promotes knowledge diversity and is based on trust and functioning dynamic networks.

Turning back to the CPR system, one of the most important rules is the *boundary* one. In the efforts to bridge between CPR and multi-tier governance needed for larger-scale and larger effects of CPRs, the definition of boundary rules "poses perhaps the most important challenge to polycentricity" (Nagendra & Ostrom, 2012, p.118). Boundaries determine the position of users vis-à-vis the common pool resource and this becomes more difficult when the resource has mobile units and its own geographical boundaries (i.e. rivers, watersheds, etc.) that mostly does not match neither administrative boundaries, nor the boundary that confines all beneficiaries and impact-bearers. "Further, common-pool resources may themselves be nested in an ever larger sequence of resource units such as a micro watershed, which is nested in a system of ever larger watersheds that eventuates into a major river system" (Nagendra

& Ostrom, 2012, p.118).

Figure 7. The transfer path from community collective action to polycentric multi-tier governance



In these very complex ecological systems, polycentric and multi-tier governance of the resources is hence unavoidable. This is not to be criticised as in fact research made by scholars working with multilevel and polycentric governance shows that such systems adapt to the different contexts, happens at different levels and through a large set of actors (public and non-public) that cut across levels, deal with the complicated issue of boundaries and cross-scales, and as Ostrom (2005) has described "create a complex net of actors and adaptive system without a single dominant authority" (Nagendra & Ostrom, 2012, p.125). Polycentric governance is not set to be the only solution, but it is extremely helpful in ensuring flexibility, robustness and adaptation of institutions and institutional design of larger-scale commons, and therefore successful outcomes of the governance system.

Further to the study of complex socio-ecological systems, larger-scale / larger-impact commons and their multi-tier governance, section 3.5 provides an analytical framework that is then employed by this research in the case of Albanian commons.

3.2 Natural Capital and Ecosystem Services

The natural capital is key to our well-being and existence, by carrying out various functions that turn into services at human demand, based on a humans' values' system. Therefore, capturing the real value of natural resources and their functions is key to

making decisions on how to use them. This may sound obvious when having some knowledge on the ecosystem functions but, practice and policy-making processes show that human care on natural resources has been either intuitive, or, at best, based on gradually increasing knowledge and a limited set of values. This has led towards the establishment of a critical discourse about how social capital makes decisions about and uses the natural capital for its own sake and often unilaterally.

There are two major governance approaches that deal with the natural capital and ecosystem services – the sectorial approach and the integrated and multi-level approach. The first is highly focused on specific aspects of the natural capital, depending on the related interest on natural resources. As such, it works by exploring issues of interest in detail and building and implementing programs that tackle in-depth that one specific issue, in isolation from the outside world. Similarly the type and number of stakeholders involved is limited to the visible problem related to the issue at stake. This is a very focused, but very fragmented approach and it is how usually ministries covering different development sectors work. The second approach is all encompassing and comprehensive, multi-stakeholders and multi-level in terms of institutions. It deals with an array of problems, presented in different tiers, but all affecting all issues at stake at different scales. The issues are interrelated, though may seem different at a first sight. The approach has not just one focus – it is rather holistic, though it tries to prioritise and establish strategic programs and action plans that cover the whole array of problems. This approach is highly integrated, but it deals with a high level of insecurity due to the large number of interrelated problems and lack of proper information – quantitative, qualitative, spatial and temporal.

Regardless of how insecure the second approach may sound, it is the one to be followed when managing ecosystems and their services. It is so because their relationship with human interests and values operates at a myriad of levels and scales that cannot be dealt with from a sectorial perspective only. Since years now, the scientific community is striving to mainstream ecosystem services into policy and decision-making (Maes *et al*., 2012), but regardless of efforts, "those ultimately governing ecosystem services continue to base their decisions on traditional knowledge production segregated to specific habitats, ecosystems, geographical areas and sectors" (Primmer & Furman, 2012, p.85). In these circumstances, in order to transit from sector governance to the integrated approach, it is necessary to increase

the knowledge on ecosystem services (ES) among all stakeholders, while developing also mechanisms that are widely accepted within the scientific and professional community and show feasibility for success to policy-makers. This will lead towards governance models promoting sustainable development and resilience of natural resources, gradually replacing traditional management practices of mere protection and conservation (Brnkal'áková, 2016). We call this the ES approach in governance, or ecosystem-based governance.

The ES approach is important, though being criticised by some scholars as anthropocentric, because it recognises bio-centric values, next to striving to find a balance between the eco- and anthropo-centric values (Brnkal'áková, 2016); (Kareiva *et al*., 2011). On the other hand, the knowledge on the value of ES, even if purely anthropocentric, it provides added value to the planning and decision-making processes, which so far have had little or no consideration on the ES. Thus, while the research on ES is still young, blending ES knowledge in governance and political decision-making is key to proactively managing the increasing demands of humankind upon the limited resources of the earth and nature's balances (Grunewald & Bastian, 2015a).

The ES value-based governance is both an issue of ecological and social complexity. It deals with scientific aspects, as well as decision-making, social interaction and power relations (Keune *et al*., 2014). As the term implies, governing ecosystems lays down the foundations for the governance of human-nature relationship, which by itself is very complex and embraces institutions, mechanisms (formal and informal), behaviours, societal and human-nature interactions (Keune *et al*., 2014); (Ostrom, 2005). Ecosystems extend their services and impacts beyond their territories, at multiple spatial and temporal scales, hence triggering highly complex interactions, a rich institutional diversity (Ostrom, 2005) and therefore a need for multi-layers governance.

Ecosystems can be successfully governed through formal (government) and informal, community and bottom-up mechanisms that guarantee their endurance. In fact, the broad array of studies on collective action points at the important role of local institutions in influencing natural resource management (Garcia-Lopez, 2013). However, the increasingly complex socio-ecological interactions and "the scales" aspect make ecosystems pretty vulnerable to external disturbances, such as the

globalization processes and the emergence of dynamic regional to global markets (Kluvánková & Gezik, 2016). Multi-layers governance may provide solutions on how to decrease vulnerability, but still two challenging questions arise: will this governance approach be reflexive and adaptive enough as to anticipate and manage the dynamic complexity and vulnerability of ecosystems? And if that is fully or partially possible, then how will it effectively address the issues of overlapping scales.

To explore answers to these questions, it is essential to analyse ecosystems from both, an ES valuation perspective and a system of rights over natural resources. In both cases, the discussion on boundaries and scales is extremely important, from both, the ecosystems side and the users/ beneficiaries/ institutions side. This will lead to understanding the complexity of relationships and identifying convergence and divergence points between self-governed systems and conventional governance of ecosystems. The discussion on rights over natural resources was already provided in the section 3.1, therefore this section will continue with the theoretical discourse on ecosystem services, their valuation and mapping, and scale aspects for their governance.

The examination of the links between ecological and socio-economic systems has ancient foundations, but early modern writers include Marsh (1874), Leopold (1949), Carson (1962), etc. Still, it is in the last 20 years that the concept got widespread attention with the publications of Costanza *et al.* (1997) and Daily (1977) (TEEB, 2012). In 2001, the United Nations initiated the largest and most significant study on the status and trends of the ecosystems in the world, aiming at generating knowledge that feeds policy advice – the Millennium Ecosystem Assessment (MA) (Shoeibi et al., 2015). MA classified humans as an element of the natural capital (Shoeibi et al., 2015), aiming at placing a common denominator among species, so that the valuing system expands to include not simply human utility values, but intrinsic and inherent values of the ecosystem to itself (Beatley, 1994). An evaluation process that considers the full set of values is still far from being accomplished, but MA successfully set baselines for further assessments, raised global awareness and taught nations the importance of undertaking integrated ecosystem assessment as a standard step in planning, management and decision-making (MA, 2005a). Most importantly, MA articulated major gaps for further research that remain valid to date, to mention the limited or lacking information on the status of ES at local level and the value of non-

marketed services; and the limited capability of environmental and ecological models to incorporate spatial, ecological and financial feedback in real-time, including nonlinear and complex changes in ecosystems (Shoeibi et al., 2015).

The Convention on Biological Diversity (1992) defined the ecosystem as "a complex of living organisms and the abiotic environment with which they interact in a specific location". The ecosystem carries out a number of functions that guarantee its existence. The OpenNESS Glossary (2016) defines the functions as "interactions … that underpin the capacity of an ecosystem to provide ecosystem services" (Potschin & Haines-Young, 2017a). When these functions become beneficial to humans or other species and are consumed by them, they turn into services, but retain their link to the underlying ecosystem functions, processes and structures (Potschin & Haines-Young, 2017a).

The European Environment Agency provides a Common International Classification of Ecosystem Services (CICES), which defines ecosystem services "as the contributions that ecosystems make to human well-being. They are seen as arising from the interaction of biotic and abiotic processes, and refer specifically to the 'final' outputs or products from ecological systems. That is, the things directly consumed or used by people" (Haines-Young & Potschin, 2011, p.2). In a further review to CICES – Version 4, the authors add "abiotic outputs from nature are not regarded as an ecosystem service for the purposes of CICES" (Haines-Young & Potschin, 2012, p.1). They also raise the importance of "making a clear distinction between final ecosystem services, ecosystem goods or products and ecosystem benefit" (Haines-Young & Potschin, 2012, p.1). In this regard, final ecosystem services has a direct link to the underlying ecosystem function/s that generate them, while goods and benefits are derived from final ecosystem services (Haines-Young & Potschin, 2012).

The Millennium Ecosystem Assessment and various authors working on the basis of MA and TEEB, group the ecosystem services into 4 categories: provisioning, regulatory, supporting and aesthetic/cultural ones (MA, 2005a); (Kareiva *et al*., 2011); (Bastian *et al*., 2015), etc. CICES is organizes services into 3 major sections, each of them having a number of divisions and therefore groups per each division (table x). The supporting services provide the basis for the other three groups to function according to MA (2005a). According TEEB, the value of supporting services is measured indirectly and contained within the value of the other services. CICES

does not cover supporting services aiming at dealing with final rather than intermediary services, as the supporting ones are often considered (Potschin & Haines-Young, 2011a). In overall, an ecosystem service leads to direct measurable benefits from an ecosystem (ECE/TIM/SP/34 2014). The benefits can be valued in monetary and/or social terms against **values** – criteria **assigned by people** to justify the importance of the benefits (Potschin & Haines-Young, 2017a).

Table 1. CICES Version 4.3 (January 2013)

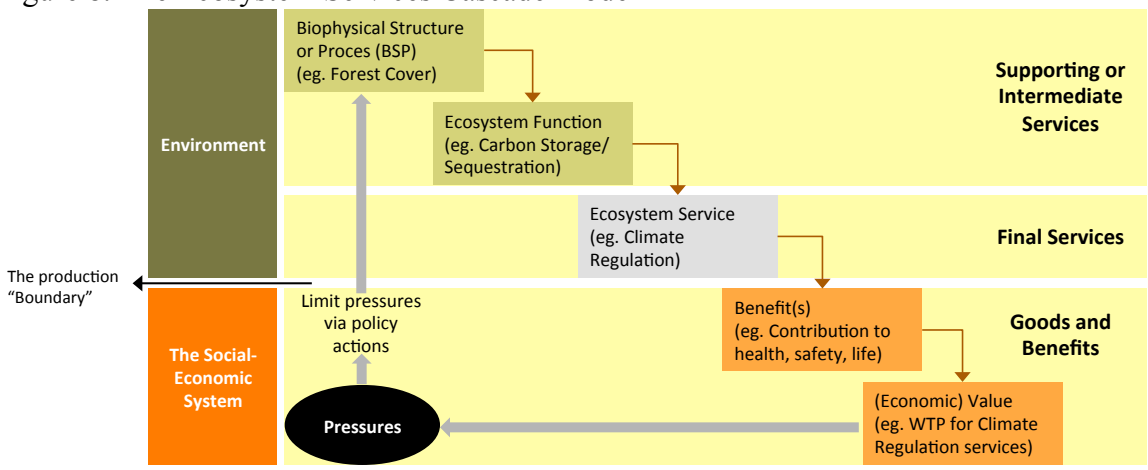
Section	Division	Group
Provisioning	Nutrition	Biomass
		Water
	Materials	Biomass, Fibre
		Water
	Energy	Biomass-based energy sources
		Mechanical energy
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Mediation by biota
		Mediation by ecosystems
	Mediation of flows	Mass flows
		Liquid flows
		Gaseous / air flows
	Maintenance of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection
		Pest and disease control
		Soil formation and composition
		Water conditions
		Atmospheric composition and climate regulation
Cultural	Physical and intellectual interactions with ecosystems and land-/seascapes [environmental settings]	Physical and experiential interactions
		Intellectual and representational interactions
	Spiritual, symbolic and other interactions with ecosystems and land-/seascapes [environmental settings]	Spiritual and/or emblematic
		Other cultural outputs

Source: Source: https://cices.eu/resources/; (Haines-Young & Potschin, 2012).

The cascade model of Haines-Young and Potschin (2011) is the frequently referred simple conceptual framework to explain the chain of flows from ecosystem processes and structures to ecosystem values. (Potschin & Haines-Young, 2011b). It is also a powerful tool in explaining the connection of ecosystems to human wellbeing, therefore a mapping framework for ES that supports European policies effectively (Maes *et al*., 2012). Scholars and projects have used it and added further aspects of the ecosystems paradigm. It shows how features and functions of ecosystems and biodiversity (defined as the supply side) can be utilised by humans (i.e. become ecosystem services), to achieve human wellbeing (the demand side) (MA, 2005a); (TEEB, 2010); (Bastian & Grunewald, 2015). The demand side puts pressures to the

supply side for more services, thus posing risks to the health of ecosystems and biodiversity, therefore requiring for policy action to set a limit to these pressures (Potschin & Haines-Young, 2011b) and ensure balances between the human wellbeing and natural capital wellbeing.

Figure 8. The Ecosystem Services Cascade Model



Source: (Potschin & Haines-Young, 2011b); (Potschin & Haines-Young, 2017b); and own visual adaptation

As simple as it is, the cascade model reveals that in the real world, the relation is more complex than the simple diagram shows it at a first sight (Bastian & Grunewald, 2015). The first difficulty arises with the "constellation of concepts that surround the idea of ecosystem services, which is far from universally agreed" (Potschin & Haines-Young, 2011b). For instance, disagreements on terminology have fed various scientific work and papers, and it is not clear as yet whether a final agreement can be reached. On the other hand, this may not necessarily be a problem as long as practical tools on the use of ecosystem services approach in policy and decision-making make a clear distinction between the composing components of the cascade model, in terms of what each component includes for the sake of the precise case. This distinction with levels and sublevels is necessary especially because different services and goods may result as final or intermediate in the cascade model and therefore the valuation process should make sure not to double-count them. However, terminological aspects are important when universal tools that allow for cross-comparison among ecosystems, areas and nations have to be built.

Box 4. Some Ecosystem Services Definitions from Crossman *et al.* (2013)

*"**Ecosystem service supply:** refers to the capacity of a particular area to provide a specific bundle of ecosystem goods and services within a given time period (Burkhard et al., 2012b). Depends on different sets of landscape properties that*

influence the level of service supply (Willemen et al., 2012).

Ecosystem service demand: *is the sum of all ecosystem goods and services currently consumed or used in a particular area over a given time period (Burkhard et al., 2012b).* ***Ecosystem service providing units/areas****: spatial units that are the source of ecosystem service (Syrbe and Walz, 2012). Includes the total collection of organisms and their traits required to deliver a given ecosystem service at the level needed by service beneficiaries (Vandewalleetal. 2009). Commensurate with ecosystem service supply.*

Ecosystem service benefiting areas*: the complement to ecosystem service providing areas. Ecosystem service benefiting areas may be far distant from the relevant providing areas. The structural characteristics of a benefiting area must be such that the area can take advantage of an ecosystem service (Syrbe and Walz,2012). Commensurate with ecosystem service demand."*

Source: (Crossman et al., 2013, p.5)

The review of the cascade model by De Groot *et al.* (2010) in TEEB (2010) added to the framework at least two challenging dimensions, namely the **human institutions (or governance in its very comprehensive sense) and human wellbeing**. Both are context-based and value based. Institutions decide on the use of ecosystem services and humans value the received benefits upon a set of societal values, subsequently trying to impact the governments' decision-making. Not only these values will be regarded and applied differently in different spatial and temporal contexts, but within the same context society, depending on the angle – institutions or community, will most probably decide to apply different criteria (values) on the use of services from those on valuing benefits.

MA (2005a) provides a good explanation on the links that exist between ES and the constituents of human wellbeing – security, basic materials for good life, health, good social relations and freedom of choice and action, which in fact act as basic push factors to the drivers of changes experienced by ecosystems and their services. The Drivers are direct, therefore unequivocally influencing ES and indirect – operating more diffusely, by altering one or more direct drivers (MA, 2005a, p.64). Direct drivers include: changes in local land use and cover, species introduction or removal, technology adaptation and use, external inputs, harvest and resource consumption, climate change, natural, physical and biological drivers (MA, 2005a). Indirect drivers on the other hand include: demographic factors, economic trends, socio-political factors, science and technology, and culture and religion (MA, 2005a). The discussion

and analysis of drivers is of particular interest to the application of the DPSIR approach in the study of socio-ecological relations, as it will appear in more detail in section 3.5.

Grunewald and Bastian (2015) study the cascade model by focusing particularly **on space and time aspects.** Both can be considered as two important variables of the context and are highly dynamic and multi-dimensional. The understanding of time and space in relation to ecosystem services is highly important in both directions: the ES and the users/ beneficiaries/ institutions that deal with ES. The use of land happens on a spatial level and is affected by the specific biophysical structures and processes of the ecosystem on that specific land [use]. If the landowner and/or decision-maker will decide to convert an ecosystem into a different land use, then the entirety of biophysical structures and processes, therefore ecosystem functions, will change. A change in ecosystem properties and potential will lead towards a change of services and finally benefits. By participating in a functions and services utilisation decision-making process, the users have posed new demands to the ecosystem potentials, while also changing ecosystem properties and services and finally impacting the expected supply in quantity and quality. This becomes a vicious circle that repeats in time and while ecosystems might easily be located as geographical units, mapping their services in spatially explicit terms is a much harder task. Furthermore, ecosystem and ES users are highly mobile and their location is dependent on their changing interests that are mutually interlinked with expected benefits and intended land uses.

Stakeholders can have different interests and reactions on the use of ecosystem services, depending on the scale of provision and analysis. Ecosystem services provision happening at various spatial and temporal scales has a strong impact on the value different stakeholders attach to the services and therefore on the management options these stakeholders deploy (Hein *et al.*, 2006). For instance local residents – forest users have greater interest and care for timber and other non-timber products, while those living downstream the watershed where the forest ecosystem is located are more interested in water regulation and purification services. At a national scale there is high interest on cultural services, but also on climate regulation services. The latter is even more evident at global scales.

Hein *et al.* (2006) highlight the importance of understanding scales (for both ecosystems and institutions), because a desirable result of scales mismatch clearance

is the sound policy decision-making about ecosystem management so that it satisfies the interests of stakeholders at different scales, without harming the existence and resilience of the ecosystem itself (Hein *et al*., 2006). Understanding the scales as of the outset will increase not only the chances for designing better governance models of the resource/s, it will most importantly increase the chances for its acceptance and applicability (Hein *et al*., 2006). This would of course lead to the implementation of the multi-layers governance paradigm for governance of natural resources, as an approach that deals with scales of biophysical structures and processes and institutions and human interests in an integrated manner. Probably this would not be the lonely optimum solution, but it would however enable resource users/ beneficiaries and institutions to relate to the multiple scales of ecological functioning, by matching ecological and social conditions in a way that participants had incentives to govern subunits of complex systems in a sustainable manner (Nagendra & Ostrom, 2012).

The understanding of scales clarifies also that the answer to the discourse is not just one appropriate scale, but rather a dynamic interaction between different scales. In fact, the higher is the variation of the scale, the clearer it becomes that there is no any single appropriate scale of analysis and a multi-scalar approach should instead be considered (Potschin & Haines-Young, 2011b); (Grunewald *et al*., 2015). Therefore, in these circumstances, the discussion on boundaries becomes a socio-physical one. It differentiates scales from space as the previous includes the latter. Space includes tangible geographical boundaries and the biophysical extent of biophysical structures and processes and their functions. Scales goes further to include also socio-economic relationships between institutions and citizens (community, users, businesses, etc.), and the impact of socio-cultural contexts and time in the modification of boundaries.

Different authors have raised the issue of scale as very important in biodiversity conservation and ecosystem services paradigm (Luck *et al*., 2003); (Luck *et al*., 2009), highlighting also that the scale related studies are still lagging behind (Dy Toit, 2010). The Millennium Ecosystem Assessment endeavour articulated that socio-ecological systems and their processes are scale dependent (MA, 2005a). Du Toit (2010) suggests that a thorough examination of the biodiversity conservation problem across scales should take place prior to any decision-making and this could be incorporated within the assessment of money, qualified personnel, time and political capital (as

limited resources affecting decision-making). He adds that examination should happen at higher and lower spatial and temporal scale and could also be applied to other dimensions of biodiversity conservation. Satake *et al*. (2008) explains the concept of scale mismatches. The latter occur "when the scale of provision for ecosystem services … do not coincide with the scale of decision-making by agents who manage resources" (Satake *et al*., 2008). Two factors are worth analysing in this definition: 1) the spatial and temporal scale between where (geographically) the ecological process takes place (provision) and where the beneficiaries or impact bearers are (appropriators); 2) the decision-makers or the agents who make decisions. They are the land-owners of the particular resources/ecosystem that provides a service and the institutions (formal and/or informal) that impact how the land-owner/s will use their resource, therefore the type of property rights. The scale mismatch is thus very complex and includes the spatial, temporal, legal, institutional and ethical dimensions.

Coping [among others] with scales' impacts in policy decision-making that affect ecosystems and their services, leads to ecosystem services mapping and valuation. The mapping process provides input to the scale/territorial specific distribution of ecosystems and their services. "It is essential to map the ecological and human systems in the landscapes where ES are to be assessed. Without the precise definition of boundaries the quantification processes will be unreliable, and in human systems ultimately legal consequences of policies require exact property boundaries" (Braat & de Groot, 2012, p.10). On the other hand the valuation of ES provides input to the understanding of the value reference system used by institutions and communities in governing natural resources, including the economic benefits and costs resulting out of this process.

Maes *et al.* (2012) summarise several reasons for mapping ES[8]: 1) analysing the spatial distribution of multiple ES at various scales (local, regional and global); 2) evaluating the spatial congruence with biodiversity; 3) analysing trends, synergies and trade-offs between different ES; 4) estimating costs and benefits of ES use on a spatial scale, and undertaking monetary valuation on biophysical quantities on the territory; 5) comparing ES supply with demand; 6) and using the information to prioritise areas in spatial planning and management (Maes *et al*., 2012, p.33). While several mapping techniques and tools have been developed, still mapping ES remains

a challenging task as it has to fill the data gaps for mapping directly the stocks and flows; ensure consistency in mapping approaches to use the same set of indicators; and incorporate the ecosystem status (conditions) in ecosystem maps (Maes *et al*., 2012).

The ES valuation instead is explored enough to provide useful valuation tools as well as to show that complete valuation is far from the horizon because of the undefined valuation reference system and especially due to scales. Global scale valuation has advanced, but local scale valuation requires detailed data and information on ES that is currently missing. In order to include ES in policy decision-making we need to assess them for their value in different decision making scenarios. For this purpose it is important to link the cascade model to a policy analysis model such as for instance the DPSIR (Driving forces – Pressures – State of Environment – Impact – Response), and then complete it with a set indicators. Indicators are communication tools that facilitate a simplification tool of the high complexity in human-environmental systems (Müller & Burkhard, 2012). Various authors such as Niemeijer and de Groot (2008), ten Brink et al (2011), etc. emphasise that indicators support specific management purposes by depicting features and/or interactions that are not easily accessible, as well as map the interaction between humans and environment in order to identify where on the territory and for which resources a change has to be made in terms of management – response (Müller & Burkhard, 2012).

Humans tend to value ecosystems for the tangible benefits they provide, showing little concern if not at all, for those services that are hard to perceive. For instance, energy, raw materials, food, timber, drinking water, medicinal recourses, etc. classified as provisioning services are marketable products, and have a market value. These kinds of services together with several aesthetic-cultural services (that one can buy – payments for recreational activities, or education) can be incorporated in a typical benefit-cost analysis and therefore accounted for in a decision-making process.

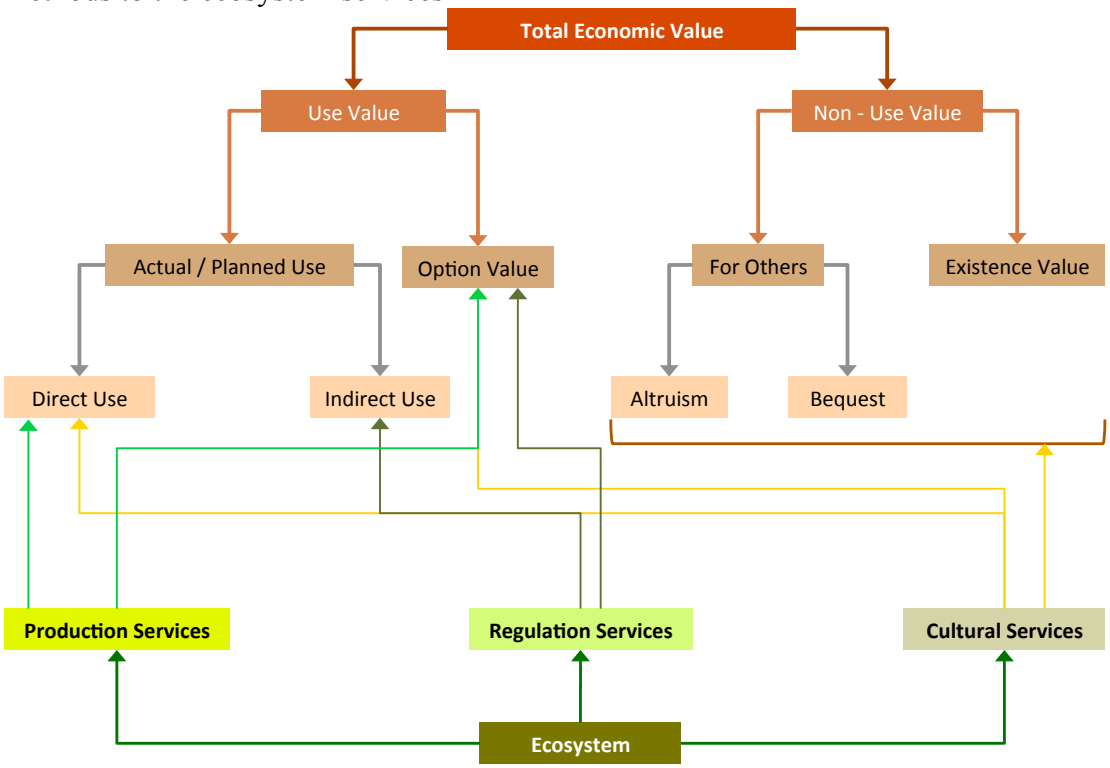
Still, it may happen that stakeholders deliberately do not consider all of them, or are unable to measure a spiritual/inspirational value, or as Pejovich (1990) defines, observe some of them being sold below their market value, even though transactions costs are low. A person derives satisfaction from certain goods, such as pleasant environment and clean air, which are scarce goods and acquiring them requires for something else to be given up (nonpecuniary goods) (Pejovich, 1990). This means

that the completeness of the benefit-cost analysis, as a key instrument to facilitate political decision-making, is not achieved and the result of using the instrument is disputable.

The assessment exercise becomes more complicated if considering services that are not easily apparent to humans. These regulating and supporting ecosystem services constitute positive externalities of the environment that policy-makers either tend to bypass, or find it difficult to include in standard benefit-cost analysis for decision-making. These services may not be obvious at the first place, but they inherently exist in the environment and are highly beneficial to humans and/or the ecosystem itself. For instance, the role of forests in maintaining the quality of air and water, next to providing buffering against extreme weather and floods, or providing habitat for species to thrive, are fundamental services that have a value that cannot be measured through market transactions. As various sources define – MA (2005), NRC (2005), Mäler *et al*. (2008), we have no ready set of accounting tools to measure the values of ecosystem services, unlike we do for traditional economic goods and services (Daily *et al*., 2011).

However, to date there is a number of means to measure indirect values as well. These means may have weaknesses and further research is needed to explore in full the complete evaluation of ecosystem services, but they provide still powerful tools to be used in the continuing ES research. The total economic value (TEV) of ecosystems is composed of the use and non-use values, each having other types of values that constitute them (DEFRA, 2007); (Hein *et al*., 2006); (Schweppe-Kraft & Grunewald, 2015) (figure 9).

Figure 9. The total economic value of an ecosystem and the link of the valuation methods to the ecosystem services



Source: (DEFRA, 2007); (Hein et al., 2006); (Schweppe-Kraft & Grunewald, 2015), own visual adaptation

The above diagram shows that for proper valuation of ES and TEV there is a need to understand: the ecological processes that an ecosystem carries out and the services they produce; the total pool of beneficiaries; and the way each of the beneficiaries receives or is impacted by the service. This requires also distinguishing between recipients of services, prior to engaging in an ecosystem valuation process and subsequently in deciding on how to use a given ecosystem. As a result, the discussion on scale and boundaries/space, including indicators becomes again very relevant and necessary.

In conclusion to this section, there are a number of issues that need further research and particular attention with regard ecosystem services. Of course the mapping techniques have to improve and overcome challenges such as scale and information. The valuation methods should be advanced to factor in all types of services, even those that are harder to perceive and quantify. However, while these lines of research are already established and need further attention, there are new lines of research that are in need of exploration and analysis. The discussion on boundaries for instance, is an issue of mapping, as much as it is an issue of understanding the user rights that

beneficiaries, owners, impact bearers and institutions have over the ecosystem services. It is also an issue of scales of the ecosystem services, but also of the human demand for services. Both, user rights and the scale of human demand affect the governance approach undertaken versus natural resources in different settings. These governance approaches are underexplored to date and there is a need to involve legal, institutional, planning and political dimensions in the analysis and research on ecosystem services (Braat & de Groot, 2012, p.13). This will lead to the accomplishment of the final aim – that of streamlining ecosystem services in policy decision-making and therefore enabling ecosystem-based governance.

3.3 Forests governance

Being home to 80% of the worlds' terrestrial biodiversity, forests provide the livelihood basis for 1.6 billion people in the planet. (WWF, 2017). Forests cover around 30% of the planets land area (MA, 2005b); (FAO, 2016) and provide a significant number of critical ecosystem services to humanity (United Nations, 2014).

Table 2. Forest Ecosystem Services

Services Categories	**Divisions and groups explained**
Provisioning Services	Fibber and Fuel: Timber and timber by-products, including roots and harvesting residues, biomass-based energy sources; Non-timber forest products: fruits and other edible products and related food by-products, craft-ornamental-gardening products, medicinal products and related by-products, seeds; Water supply: surface and underground water.
Regulating Services	Climate regulation: carbon capture and storage, protection from extreme temperatures and wind; Hazard regulation: protection from soil erosion and land slides, and floods; Purification and detoxification of soil, water and air: pollution absorption and purification, noise abatement; Disease and pest regulation: reduce the damaging effects of pests and pathogens; Pollination: habitat for pollination species.
Cultural Services	Health: physical and mental well-being and recreation and enjoyment; Nature and landscape: connection to landscape and wildlife; Education: formal learning and personal development; Economy: improved livelihoods, tourism, employment; Social development: strengthened social relationships and capital; Symbolic, cultural and spiritual significance: related to history, religion and beliefs.

Supporting services	Primary production: fixation of CO_2 by plants resulting in plant growth and O_2; Soil formation: soil breakdown and accumulation of organic matter; Nutrient cycling: carbon, nitrogen, sulphur and phosphor; Water cycling: the hydrological cycle through moisture interception and transpiration; Biodiversity: genetic material and provision of habitat for species

Adapted from (Sing et al., 2015)

While discussing forest governance, other authors have highlighted the social values associated with forests. Forest ecosystem services include also values of a social and cultural character. However in a governance discussion where the focus is placed on institutions and especially on local people, unravelling further the social values is of interest. This helps in explaining how local users do influence forest governance and how forest governance may fail to achieve its sustainability objectives, if it does not provide sound rights to forest users, who see their livelihoods strongly related to forest resilience. The following is a summary of these social values as provided by Bass (1999) in (Mayers & Bass, 2004):

- Livelihood basics: staple and supplementary food, health and shelter;
- Economic security: main and supplementary income, savings and social security (timber and land value), risk reduction (biodiversity, multiple products, etc.);
- Cultural and social identity: social identity and status, cultural, historical, spiritual and symbiotic associations;
- Quality of life: education and science (access to forest), recreation and aesthetic values.

Regardless of their value, forests see worldwide a deforestation and degradation trend with about 13 million hectares per year worldwide (FAO, 2015b), therefore being responsible for about 15% of all greenhouse gas emissions (WWF, 2017), due to reduced overall carbon sequestration capacity. According to estimates, agricultural expansion is the proximate (direct) driver of about 80% of deforestation (Kissinger, Herold and De Sy (2012) in (FAO, 2016)). On the other hand, underlying (indirect) drivers include population growth – resulting in urban expansion and increasing food demand, land-tenure security and the governance of land use change (FAO, 2016). Gupta (2012) argues that deforestation and forest degradation drivers depend on the ability to set a profitable market value for most of the forest products as opposed to other land uses (agriculture, infrastructures, industry, biofuels, urban areas) that can be assigned to the forest land. To date, the alternative land uses appear to be more

profitable to the societies in the short term, therefore strongly competing forest uses and functions in the market (Gupta, 2012). With an increase of the planet's population to reach more than 9 billion inhabitants in 2050, FAO expects that while most drivers will loose some importance, the urbanisation – due to population expansion, and climate change will increase their contribution to forest loss (FAO, 2015a); (Alexandratos & Bruinsma, 2012).

Because of the above facts, "forests have been on the global agenda for at least half a century" (Gupta, 2012, p.620). However, while all forest services are recognised, at least scientifically, most of the interest on forests is generated due to their role in reducing carbon emissions and dealing with climate change uncertainties. Probably, the latter is also the key reason why forests are becoming more important on a global scale for all their ecosystem services rather than the merely provisioning ones (Shoeibi *et al*., 2015). Referring to the Millennium Ecosystem Assessment (2005), Shoeibi *et al.* (2015) state that forest ecosystems "absorb 57% of total water runoff on a global scale and in most countries, the non-marketed values of forests add up to more than two third of the total economic value" (Shoeibi *et al*., 2015, p.2). In a follow-up to UNFCCC[9] (1994) and the Kyoto Protocol (1997), countries participating to the Paris Agreement (2015), according to the article 2 of the agreement aim to strengthen the global response to the threat of climate change and efforts to eradicate poverty by holding the increase in the global average temperature to well below 2^{o}C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5^{o}C above pre-industrial levels (United Nations, 2015). In the case of forests, countries are expected to intervene with forest management and grazing and afforestation, in order to revert land use and cover change in favour of an enlarged forest area as carbon sink.

At a European Union level forests and other woodland cover more than 40% of the EU land area with around 60% of the forests owned by private owners (EC, 2013). In order to address the sustainable development of its forests and deal with climate change uncertainties and mitigation, EU has in years undertaken a number of policies relevant to forest related activities that are currently framed within the new EU Forest Strategy (2013-2020) and the Multi-annual Implementation Plan of the new EU Forest Strategy (2015). The first EU Forestry Strategy dates as of 1998 and its implementation was revised in 2005 to conclude with a EU Forest Action Plan in

2006. This review was intended to cover socio-economic and environmental issues, as well as forest governance and use of wood as a source of bio-energy (Shoeibi *et al.*, 2015). Next to these very specific policy documents that have a more holistic approach in addressing the future sustainability of forests, EU has addressed forests peripherally or indirectly through other policies and actions, such as: the water framework directive – recognising the role of forests in managing flood risks; the Biomass Action Plan (2005) – considering forestry as a key sector in achieving its objectives and particularly the supply of biomass; the [new] EU Biodiversity Strategy (2011-2020) – placing an emphasis on ecosystem services in general and highlighting sustainable agriculture and forestry as one of the six targets it has (Shoeibi *et al.*, 2015).

In their analysis of the state of European policies and scientific knowledge on forest ecosystem services, Shoeibi *et al.* (2015) conclude that there have been improvements in EU forest policy making since 2006, but still these policies and the scientific knowledge have not followed the MA formulation. They identify a number of issues that become challenges for EU in addressing sustainable forest management through an integrated and holistic approach:

- So far forests have not been a direct EU policy concern. The fact that forests fall under "environment" and "agriculture" as two of the sectorial pillars of the EU policy and legislation may justify this to a certain extent. However, this may have also kept the interest on forests far from turning into a full fledge policy field, followed by numerous actions and hence a more proactive member countries' approach.
- As a result of the rather indirect way of dealing with forests, a non-comprehensive forest monitoring and information system was established. TEEB[10] for instance focuses on mapping and assessing ecosystem services, but it relies on the EU Biodiversity Strategy, therefore disregarding a vast range of forest services (Shoeibi *et al.*, 2015). Other databases and initiatives such as FORESTMOD[11], Eustafor[12], European Forest Data Center and Natura 2000 Network have particular focuses each, therefore covering in total wood products, biodiversity, greenhouse gasses, and climate regulation and forest fires. Again, a significant number of other very important forest services do not appear in the databases. While we have long valued the forest for things

that have very tangible monetary worth, it is extremely important now to be able to demonstrate and capture the values of its services that are difficult to measure or even priceless (United Nations, 2014).

- Due to this fragmented approach, the particular attention on forest services is related to provisioning, climate regulation and biodiversity only. Both forest strategies try somehow to overcome this limitation, without being though able to move out of the overwhelming frame of priority topics such as biodiversity, agriculture and climate change. In a way, these other issues have dictated the attention paid to forests and their ecosystem services. Furthermore, while the Common Agriculture Policy represents a good case of a particular sector integrating also issues of sustainable forest management, this is not exactly the case with other sectors (i.e. the water directive, biodiversity policies, etc.). In general, the sectors maintain a sectorial approach to the development rather than trying to employ an integrated ecosystem-based one (Shoeibi *et al.*, 2015).

One of the aspects that do not substantially appear in the EU forestry policies is forest governance. Several authors that study forest governance consider it as the way to achieve those objectives that countries aim at national, regional and global scale – i.e. protection of environment, reduction of poverty and development of the social capital while enabling economic growth. Poor forest governance can have significant negative impacts on the achievement of these objectives as well as on forest conservation and management (Mohanty & Sahu, 2012). Poor forest governance leads to deforestation and through allowing or promoting overexploitation, forest concessions that are not followed by proper monitoring, and absence of governance/management activities (Arts & Visseren-Hamakers, 2012).

The governance literature argues also on the evolution from government to governance and one of the main features in this evolution is the involvement of other actors rather than state and public institutions in the governance process, with the assumption that they become influential in policy-making (Kleinschmit *et al.*, 2009). However, this shift is highly complex, not simply for the mentality shift and new practical mechanisms it requires, but also because of the multi-dimensional character of governance, which includes the traditional "government" as one of the modes of governance (Howlett *et al.*, 2009). Governance as a concept has 3 dimensions

according to Howlett *et al.* (2009), namely the political dimension of power distribution, the institutional dimension that corresponds to the previous and the respective regulatory dimension. Each dimension can be presented in a diagrammatic fashion with solutions moving along a horizontal and vertical scale – with hierarchy and pluralism in the horizontal scale and power, formality and strength of law on the vertical scale. The analysis shows that while it may be thought that moving from government to governance employs a simultaneous shift of all three dimensions, in reality it is so much more complex (Howlett *et al*., 2009), not only because the options are not of a binary type and vary along the scale, but also because the variety of combinations between the 3 dimensions is very high.

Arts & Visseren-Hamakers (2012) suggest that new forest governance means new modes of governance beyond the confines of the state, including the following modes: "(1) participatory forest management; (2) decentralization of forest administration; (3) forest certification; and (4) payment for environmental services (particularly REDD+)" (Arts & Visseren-Hamakers, 2012, p.253). Under the frame of new governance, private regulation of forest governance has also increased aiming at protecting the biodiversity in forests. This has resulted in numerous forms of public-private partnerships and engagements that include governments, businesses and civil society, but because of focusing often on single biodiversity threats, the impact of these partnerships has in most cases been limited (Visseren-Hamakers & Glasbergen, 2007), therefore leading to the need for a more polycentric approach in terms of both actors and target issues.

REDD+ governance for instance intends to "create financial incentives to help countries reduce their deforestation rate", under the motto that "managing forests sustainably contributes to reducing greenhouse gas emissions while at the same time a reduced threat of climate change implies fewer risks to forests" (Gupta, 2012, p.622). REDD+ builds on the practice of Payments for Ecosystem Services (PES) and "is being piloted in a number of projects through bilateral initiatives (e.g. between Norway and Indonesia) and multilateral initiatives (through the UN and World Bank). REDD+ is a good example of market governance *with* the state" (Arts & Visseren-Hamakers, 2012, p.248).

Box 5. Payments for Ecosystem Services: quotations from "The value of Forests: Payments for Ecosystem Services in a Green Economy", United Nations, 2014

"Payment for ecosystem services (PES) is a tool to enable a forest owner or owners to capture the financial benefits from the positive externalities derived from forest ecosystem services and encourage them to continue to provide these services to another party or society at large.

The UNECE defines PES as "a contractual transaction between a buyer and a seller for an ecosystem service, or a land use/management practice likely to secure that service." (UNECE, 2007).

Labeling, certification, and payments for ecosystem services can complement regulation, by encouraging consumers of ecosystem services to recognize and pay for their value. PES should change the economics of ecosystem management to support biodiversity-friendly practices that benefit society as a whole (TEEB).

Basic principles of PES projects:

- Participation in PES schemes must be free and voluntary.
- The compensated ecosystem service, or land-use, likely to provide the service is well defined.
- At least one provider is involved.
- At least one buyer exists.
- The ecosystem service provider guarantees the availability and conservation of the particular ecosystem service. This proviso is called conditionality: the buyer needs to know they will continue to get what they have paid for."

Source: (United Nations, 2014)

Red+ has certainly value in regard to raising global awareness among communities and governments regarding the role of forests in climate change and vice-versa. While it has had positive impacts where applied, at the same time it employs a risk of lose-lose results instead of its expected win-win situations. This may be due to different factors that relate to: the complexity of the local contexts, such as allocation of rights; the methodology itself – putting a price on forest services leading to commodification of forest products in the market and therefore confrontation with the related challenges; the politics behind the governance mechanisms – shifting attention from the disinclination of some countries to meaningfully participate in the climate change actions by reducing their industrial emissions (Gupta, 2012, p.624).

A crucial aspect of forest governance is the participation of all relevant and affected stakeholders. Besides the importance that inclusiveness has gained in governance as one of its dimensions, this is also based on the fact that forest services are provided at different territorial scales and different stakeholders bear different benefits on different scales. While local communities holding historical rights on forests build their livelihoods and social development out of the forest resources and spiritual and religious values, the whole planet benefits from the biodiversity and carbon sequestration services. According to Agrawal (2007), forests are dynamic spaces, where multi-scale conservation and livelihood goals meet and often overlap, therefore representing complex social-ecological systems, where the wide array of governmental and non-governmental organisations attempts intervention. (Barnes *et al*., 2017). In these circumstances, a single mode of governance – either top-down or bottom up is not sufficient, let alone successful. A combination of institutions and rules that fit the local ecology and the social and cultural development of the community, able to adapt and modify, would be the most legitimate and equitable form of governance (Ostrom, 2009a); (Nagendra & Ostrom, 2012). In this regard, community forest management – community-led forest institutions (Barnes *et al*., 2017) and common pool resources' regimes for forests, all established within the wider frame of polycentric and multi-tier governance have shown most successful in managing forests in a sustainable way. Still, also in these cases a close cooperation with public institutions of the government is necessary for all actors to achieve their goals while protecting forest ecosystems.

So, while managing ecosystems from a commons' perspective the users make wise decisions – the case for robust CPR institutions, which have good impact on ecosystem services. However they do this mainly in an intuitive rather than through a rational and well-informed process. They have not any specific purpose of safeguarding ecosystem services rather than using the forest rationally for their benefit and that of their children. However they achieve good results and examples in literature show that this is due to two factors (usually combined): the CPR institution is working well and ES protection is a positive externality of this process; the institutions have also better knowledge of the biophysical systems. It may be the users/appropriators who have this knowledge or it may be external actors or structures attached internally to the community that have this knowledge and support these

communities. In general, technical capacity and empowerment of forest users, community interests, local knowledge of the biophysical conditions and norms of other appropriators, and social capital appear as factors that influence the ability to deal with appropriation and provision dilemmas (Barnes et al., 2017).

In conclusion to this section, protecting forests is vital to protecting the future of this planet and this can be achieved through sustainable, multi-tier and multi-dimensional forest governance. This employs a combination of different modes of governance with stakeholders' involvement as a key step, under the frame of new forest governance, as well as inclusion of forests' ecosystem services and their valuation in policy decision-making Proper forest ES valuation should be revised to be multi-objective rather than timber, biodiversity and climate-change focused. It should also be multi-scale, hence waving from single to landscape scale, and adaptive in order to factor in the uncertainty from climate change and all other vulnerabilities (Palahi *et al*., 2008). This of course requires the development of further and better information acquiring means and analytical tools to assess the impacts of policy-making scenarios realistically and on time, as well as institutional capacity building and a multi-stakeholder cooperation. It requires furthermore the strengthening of the property rights system on forests, to increase the incentives of users towards protecting the forests, to match the local context needs and culture and ensure robust institutions that guarantee sustainable forest management.

3.4 The Watershed [scale] and its Integrated Management – a large scale for CPRs

Forests represent a significant case of multiple ecosystem services, complex socio-ecological interactions and natural resource dependencies, a natural resource that is managed concurrently by a vast number of institutions operating at different scales and governance levels, and finally a critical factor in carbon sequestration worldwide. Identifying the appropriate governance mechanisms and institutions for a sustainable governance of forests at any level and across them, is therefore a fundamental policy concern. The theoretical discussion so far shows that just one form of governance is not sufficient, even if proven successful at its operating level or scale. In fact a multi-tier approach is required, which raises the concern of boundaries. The multi-tier approach is both polycentric and multi-levels and it allows for territorial governance of the forest as an ecosystem. But, as the term implies, the designation of the

appropriate territory remains an unresolved issue. And in fact, referring to the "context-fit" and "place-based" concepts, as described by Ostrom and other authors, maybe it is not even necessary to designate one appropriate territory, let alone provide this as a recipe for different contexts.

However, the need to discuss the territory both as a whole – physical space and social construct, and as a composition of smaller patches – areas that may function independently, is still valid because it helps to integrate the process of forest ecosystem governance within the wider governance, spatial planning and land development processes. If the territorial or space-time dimensions of ecosystems and their services are not "well understood, the conclusion is inevitable that nature and its services cannot be integrated adequately into political decision-making processes" (Grunewald *et al*., 2015). The latter also list potential policy and research questions that relate to: the specific methods that can be applied at different scales; the harmonisation of spatial approaches in SES, especially for instance when spatial planning has to give an important thought to the environment; and to the distribution of supply, demand and finally response options where supply can meet demand and demand is shaped to match supply, on space and at different scales (Grunewald *et al*., 2015).

The ecosystem services discussion in chapter 3.2 raised the issue of supply and demand for ES and the hardship of mapping and matching both. While most mapping work has taken place on the supply side, it seems being more difficult to map the demand and therefore the drivers of human pressures on the ecosystem. Understanding both, time and spatial scales and units of Service Providing Areas (SPA) and Service Benefiting Areas (SBA) helps in understanding the dynamics of ES supply and demand, as well as the transfer of ES assessments over different scales (Grunewald et al., 2015) (Nedkov & Burkhard, 2012). For instance, a forest ecosystem may be easily located geographically and described and analysed as a SPA. However, its boundaries and space do not match with the corresponding SBA – the latter involves the community that directly benefits from the forest, i.e. the CPR users; the government entity that is responsible on governing the territory, where that forest is located and most probably other resources of the forest (than timber); the residents of the nearby city for the urban air cleaning services; the local people who live

downstream the catchment area where the forest is located (for water purification services), etc.

It is thus clear that not only the ecosystem provides positive externalities (services that benefit others leaving outside of the ecosystem) in multiple scales, but is also impacted by the decisions of a large group of actors and institutions, operating at different scales and various hierarchical levels of the government. This brings again to the initial question in this section – is there any appropriate territorial scale or unit for managing complex SES that is "ecologically reasonable and also policy relevant" (Grunewald *et al*., 2015)? By citing Haase and Mannsfeld (2002), Bastian *et al.* (2006) and Blaschke (2006), Grunewald *et al.* (2015) mention a few, such as: ecosystems, watersheds, landscapes and geo-chores. They also provide an overview of how these ecologically important spaces link to the politically constructed spaces, placing the ecosystem for instance in a local level and the landscape and the catchment area in a regional level. While the ecosystem matches with the CPR biophysical boundaries, the regional level is the starting point for the consideration of large-scale SES, where the higher level of social-ecological relations' complexity acquires for multiple governance mechanisms and institutions to operate in a network, while using the successful lessons of the small CPR scale. This regional level is also important in mediating between local and global scales. Let`s reiterate that, though not always the case, SPAs are often smaller compared to SBAs and mapping SBAs remains a hard and unresolved task.

The watershed is a regional space with a strong ecological integrity character. It is naturally self-functioning while providing shelter to a large variety of ecosystems and natural resources, each of them functioning as a CPR. Van Oel *et al*. (2009) consider the river basin as an asymmetrical CPR, consisting of a network of smaller/local common pool resources, with externalities becoming most probably unidirectional (Van Oel *et al*., 2009). By citing Bardhan and Dayton Johnson (2002) they state that those living downstream are most probably more disadvantageous than those living upstream. However (they continue), on the other hand, the ones who live downstream can benefit of plenty up-stream-born ES, such as higher amounts of water (Van Oel *et al.*, 2009). Because each ecosystem within the watershed functions (virtually) as a CPR, but the respective benefits (supply) interfere with demand from the other CPRs and the urban areas, Van Oel *et al*. (2009) raise the question whether CPR concepts

and principles could also apply to the larger river basin scale. In order to understand to what extend CPR institutional arrangement can be applied or harmonised with those that happen at a watershed level, it is first necessary to understand the watershed as an ecological and political spatial scale and as a planning unit.

Watershed planning and related methodological aspects constitute an important area of the environmental planning. By merely the terminology – "watershed planning", we understand two major factors that are implicit to the terms: i) the spatial scale and the system – the watershed, which is composed of a multitude of ecosystems and urban systems, thus having an intrinsic need for environmental thinking and actions; ii) the spatial planning methods and approaches – these should be combined and used jointly to address the complexity of planning challenges in a very complex spatial context.

The definition of the watershed has evolved from literally a boundary/line of a watercourse drainage area into "an area of land within which all waters flow to a single river system" (Heathcote, 2009). The UN conference of Water in Mar der Plata, March 1977, a landmark event in water management, defined that the problems of land and water scarcity and access should be dealt (among others) through integrated land and water management for multipurpose river basin development, taking place within national planning (United Nations, 1977). This is an historical definition as it lays out the basis for using planning as a platform, or overall framework, for discussing and solving issues related to natural resource management, specifically water and land resources. Following this global awareness-raising event, the UN conference of Rio de Janeiro in 1992, a forum of global environmental issues, resulted into global actions aiming at: integrated approaches for dealing with environmental challenges; management systems and not system components; management of water through locally responsible and efficient systems (United Nations, 1992).

Obviously, these objectives raise the need for using approaches that combine methodologies and analytical tools and promote stakeholders cooperation at different levels of the society and governance. A focus is likewise put on the preferred territory – the watershed as the "appropriate" geographical area for undertaking integrated spatial planning, with a strong environmental dimension. The watershed represents a broad system, composed of several smaller ecosystems and institutional relationships

and clues, where local management and decision-making add up, thus giving rise to a larger societal outcome with positive effects on the environment.

"Watersheds are biophysical systems that define the land surface that drains water and water-borne sediments, nutrients and chemical constituents to a point in the stream channel or a river defined by topographic boundaries. Watersheds are the surface landscape systems that transform precipitation into water flows to streams and rivers, most of which reach the oceans. Watersheds are the systems used to study the hydrological cycle and they help use understand how human activities influence components of the hydrologic cycle." (Brooks *et al*., 2012). Physically, the watershed is composed of the drainage network – i.e. the system of connected water channels in a tree like shape, the drainage basin – i.e. the area feeding water to the drainage network (Marsh, 2010) and the landscape – the entirety of ecosystems that are visible on the land and the entirety of functions that they carry out (Marsh, 2010). This implies that the aquatic system is interlinked with its terrestrial features (soil, geology, topography, biodiversity) and climate conditions (DeBarry, 2004).

Brooks et. al. 2012 defines the water as the common denominator of the watershed and its components, because: water reflects/mirrors the activity on land; upstream activities on land or in water affect the welfare of those living downstream; the quality and the quantity of water affects all natural and human-made cycles and events in the system; and the water[course] is basically and physically the backbone of the watershed system. As a result, the sustainability of the watershed as a system depends on its hydrologic equilibrium (DeBarry, 2004) and eventually on the relationship between water and the habitat.

The water drainage network in a watershed works based on a principle of stream order/hierarchy, with first order channels having no tributaries and flowing into the second order channels, the latter discharging into the third order and so on, till the main river flows usually into the sea. The knowledge on the relationship between the drainage network, the basin itself and the landscape is key to the watershed planning process and related [political] decision-making. It helps to identify and recognise constraints and values, as well as natural means for overcoming the obstacles that urban development causes to the balance of the ecosystems in the watershed. For instance, some of the key problems induced by urbanisation in natural sites of a watershed include stormwater and flooding, increased water pollution downstream,

soil ceiling and growth of the impervious surfaces, increased sedimentation and deposition, decreasing air quality and increasing erosion due to deforestation, land slides, loss of critical habitat, etc.

A key feature of the *drainage network* is its density, defined as the ratio of the overall length of the streams composing the drainage network with the area of the whole basin and measured in length/unit area. Higher densities show for increased steepness of the slopes in the whole, or different parts of the basin. This information, together with data on geology, biodiversity and soil lead to the understanding of the river basin carrying capacity – the quantity and type of development that a basin can carry, without compromising ecosystem functions and risking environmental and ecological degradation. The knowledge of the watershed carrying capacity allows planners to make sound decisions on the appropriateness of developing the areas of the basin and the kind of development that is allowed to take place.

Planning outcomes differ across the hierarchical network of the *basin* (Pert *et al*., 2010), due to the distinct attributes that its three interrelated composing parts have. Thus, the first zone, the contributing one, receives most of the basin`s water and generates runoff. It is located in the upper outer part of the basin and as such it has rather gentle slopes and small and diffused surface flows. Therefore, it is the least susceptible to drainage problems (Marsh, 2010). This area is relatively peripheral in the watershed and the urban development pressures are rather low, or non-existent. Planners and decision-makers also tend to safeguard this area, due to its contribution in water replenishment and other important ecological functions. The other two zones, namely the collection zone and the conveyance zone are subject to drainage problems, though in different ways. The collection zone is also situated in the upper basin, but in its inner part and in periods of runoff is prone to inflooding (Marsh, 2010). The conveyance zone, on the other hand, contains the main stream-channel and valley, with groundwater providing the stream base flow and surface waters and stormflows derived mainly from the upper zones. Both, the collection zone and the conveyance one are more likely to be prone to urban development pressures, due to their location in the watershed, proximity to ground water and water sources, as well as ease of accessing communication networks. The conflicts between urban developments and the ecosystem functions that the watershed carries out in these areas are quite prominent and require continuously for innovative and integrated planning solutions.

The watershed *landscape* is composed of ecosystems; in other words it contains a multitude of "local networks of interacting plants and animals and the landscape in which they live" (United Nations, 2014) (ECE/TIM/SP/34). These interactions are mirrored into hundreds of biogeochemical and physical processes taking place in the ecosystem, named as ecosystem functions. Once these functions gain value and prove to be beneficial to users (humans or nature), they turn into services (Kareiva *et al*., 2011). A watershed is exceptionally rich in multiple ecosystem services that, depending on the category they belong, may have a provisioning, regulating, cultural and supporting role. Each service, as the term implies, has a value for the users who are willing to pay for it, or sacrifice something else in return to a given service's benefits. The willingness to pay implies that humans are the beneficiaries and does not comprise the value of the ecosystem and its services to other users, i.e. other species and the ecosystem itself.

Calculating a total economic value for a given service is as yet a rather incomplete task, though it may involve different types of values (direct, indirect, etc.), as it merely consists of the concept of ecosystem value as humans understand and use it. Any attempt to consider ecosystem value for itself, or inherent value as (Beatley, 1994) defines it (Randolph, 2004), remains however unilateral as long as it is human-driven and based on human reasoning. Regardless of its incompleteness, having to know the economic value of ecosystem services in a watershed is key to an informed planning decision-making. It provides input to the benefits and costs analysis, by adding external benefits to the comparison of land use/development alternatives and making the whole analytical process more comprehensive and representative. It also increases the acceptability of the planning process, by showing that rather than forecasting future, planning builds up future in an informed way and based on evidences.

The analysis that precedes watershed planning and management should entail interpretation of the biophysical interrelations between the water network, the basin area and the ecosystems, and of the values of the natural capital, as shortly described above. This will guarantee that ecosystem management goals and their sustainability are accomplished at a watershed scale, as DeBerry (2004) suggests, thus leading to achievement of sustainable watershed environmental planning. Because the system is extremely complex, with ecosystems and related services in continuous conflict with

human-made developments that do not necessarily recognise the natural hydrology defining the watershed as a spatial unit, it is necessary for the analysis first and then planning to embrace the comprehensive approach. The latter, although a strategy that is increasingly advocated in the literature, remain still a relatively new concept (Heathcote, 2009) in terms of implementation.

The comprehensive approach should integrate the aimed stability and resilience of natural system's components with social and institutional objectives, leading to integrated watershed planning and management. The physical facts/features of the watershed and the political realities have to be brought together to achieve integrated watershed management (Brooks *et al*., 2012). All practices can be embedded in the integrated spatial planning framework, based on issues confronted by different water managers at international level (Heathcote, 2009):

- Water availability, requirement and use;
- Water management and institutions;
- Water quality.

1. Discussions and studies on water availability, requirements and use, include a large array of aspects, such as water extraction for drinking and other uses, including waterborne commerce; management of extreme events such as floods and draughts and any other impact resulting from climate change; protection of aquatic and wetland habitat; forecast, prevention, management and mitigation of climate change occurrences and effects (Heathcote, 2009). Land use planning is vital to governing water use, through, among others, designation of sites and properties for locating residential blocks, industrial zones, recreational activities, and forestry and agricultural processes. All these sectors have different water consumption necessities, which impact the infrastructural system of water supply/distribution and relate strongly to the availability of water sources in terms of location, quantity and quality. "In fact, water stress is the result of conflicting water uses or requirements… Furthermore, economic demands conflict with other uses." (Kissling-Näf & Kuks, 2004).

Rates of water extraction for drinking water or other industrial uses should be planed so as to maintain a balance with replenishment rates (Ostrom, 1990). The exceeding extraction rates will not only decrease the available quantity of water at the respective

source; it could also increase the potential for salt water intrusion, if the water sources are in/close to a coastal area, thus affecting quality next to quantity. The construction of hydropower plants is deemed important for economic development, non-polluting energy production and fostering of energy independency. Yet, on the other hand, it affects negatively the biodiversity of the water source and the surrounding ecosystem; it decreases quantities supplied to local residents in the rural areas; and increases the chances for desertification and coastal areas alteration.

Next to the use of land, the type of property right associated to water sources and the corresponding plot is also a factor in favour of conflict mitigation or exacerbation. The ownership of a water source is often related to the ownership of land, while the ownership of the major water systems, such as lakes, rivers and their basins, coastal waters, estuaries, etc. is often not related to land ownership (Kissling-Näf & Kuks, 2004). Therefore, particular resources are owned privately or in common, with also cases of non-full ownership that results in a set of rights from the overall bunch of property rights. On the other hand, the major water systems are usually considered a public natural resource and owned by the governments. Nevertheless, whether one type of property or the other, this depends on the property rights [re]distribution and legal system of a country. As a result, the level of complexity in managing the water source and defining appropriate level of use and extraction, while also coping with rivalries on the source and on effects of the sources use on ecosystems, will depend on the specific context-based legal framework.

2. Institutional and legal frame for the management of water and other natural resources: The planning framework is key to this dimension as it provides the grounds for integrating territory and natural resources into a common management platform as of the outset, where regional agencies in particular can play a crucial implementation and management role. If the planning system takes a merely physical and urban approach, then it will disregard the vertical and horizontal integration among development sectors and their effects on the territory. Water issues should not be dealt with simply through a sector's perspective, but in relation to the territory, the ecosystems and their services. This calls for an integrated planning approach. Heathcote (2009) defines that water management strategies have often failed because of not incorporating the full range of stakeholders' values and perspectives on water. As cited in Heathcote (2009), "Wilkes (1975) Van Ast (1999) and King *et. al*. (2003)

note that the success of many major basin projects has been hampered because different agencies are responsible for water supply and for water quality, and the two are not always effectively coordinated."

The integrated approach also places a particular focus on the region as an intermediate and rather elusive space, which can be dynamically modified to comprise multiple ecosystems and administrative territories in a spatial combination that is suitable to achieve both political/institutional and ecosystem objectives. The watershed is the natural region that can respond to this aim.

The planning approach will also address financial issues, next to the study of costs and benefits, ownership issues and institutional arrangements to guarantee property rights on land and other resources, and also the organization of infrastructure systems and urban structures, considering that the latter make use of and directly affect the natural landscape. The institutional and legal framework is very broad and complex as it covers both sectorial and cross-sectorial aspects and it also contains the procedures for decision-making. This frame does not limit to public institutions and procedures only; it rather considers carefully also the institutional dynamics of the communities that exist within the watershed boundaries, the interactions that exist among them and the incentives (Gregersen *et al*., 2007) and/or coercion that steers stakeholders' behaviour.

Institutional arrangements have the challenge of dealing with the various conflicting interests that could be summarised as the potential conflicts of the sustainability 3E's objectives, as Scott Campbell (1996) suggests: i) the property conflict between economic development and the equitable distribution of opportunities; ii) the resource conflict between economic development and environmental values; and iii) the development conflict between equity and environment (Campbell, 1996). To address these challenges, planning uses various mechanisms, such as strategizing, regulatory and monitoring ones, fiscal and financial, and public investments (Gregersen *et al*., 2007). The successful implementation of these mechanisms depends among others on the degree and level of stakeholders' participation as off the planning process and the cooperation among and within them during implementation of watershed management actions.

3. Quality of water and other natural resources: As Eswaran *et. al*. 1995 defines, "the health of the watershed determines the health of a nation. Poor ecosystem management has and will result in the impair functioning of the watershed, which in fragile environments can lead to ecosystem collapse" (Jagir & Eswaran, 2000). The quality of water sources (coastal, oceans, lakes, rivers and reservoirs) cannot be sustained without a guarantee on the vigour of ecosystems. Protecting and restoring water resources can be achieved through management of pollution sources (point/non-point) and of other factors that jeopardise the quality of water bodies, as well as through strategies and actions that point at ecosystem elements, or other natural resources, in close connection to land uses.

For instance, referring to Gregersen *et. al*., 2007, rain-fed and dispersed agricultural cropping is a common land use in many upstream watersheds. While individual contributions resulting from it to the economy and the ecosystem are relatively small, the aggregate contribution is very significant. Intensive agriculture on the other hand has yet a bigger impact, though mainly in the lower lands, by transforming large natural areas into agricultural ones and substantially increasing the amount of agriculture-borne nutrients that percolate soil and contaminate groundwater. Therefore, not only agriculture lands expansion results in loss, or modification of biodiversity, but it also loads water sources with chemicals and other pollutants that infiltrate the soil through water from precipitation, or irrigation practices.

However, next to agriculture, there are also the unsustainable forestry practices, livestock over-grazing and urbanization tendencies that altogether alter the habitat, cause harm to the ecosystems in a watershed and stimulate further climate change occurrences. The latter cause an increase of fresh and salt-water temperature, hence threatening cold-water fish habitats (Marion *et al*., 2014), local climates and other species that depend on certain weather conditions. Climate warming will result into worsening qualities of water sources, thus not only lowering the response to demand for clean and qualitative water – for instance the increase of salinity in the coastal fresh water systems is likely to increase due to sea levels rising followed by seawater intrusion (Marion et al., 2014), but harming the biodiversity as well.

Overstocking livestock can cause eventual losses of high value forage and species, compaction of the soil and therefore reduced infiltration of surface water and overflows on land (Gregersen *et al*., 2007). This activity happens mainly in the upper

(first) zone of the watershed area, according to Marsh 2010, but its effects are felt in all three zones. Similarly, wrong forestry practices, deforestation and unsustainable forest management can impact any of the three watershed zones, depending of the forest location, through decreasing water infiltration, diminishing evapotranspiration rates and holding back groundwater purification, next to loss of biodiversity, and will increase perils from soil erosion and land slides.

Erosion, beyond posing a risk for settlements when close, has a critical impact on the quality of water and transforms water bodies, due to sediment created by surface erosion (carried through precipitation and surface runoff). Further on, the expansion of urban surfaces causes the soil sealing phenomena to augment, resulting into storm water floods, extreme reduction of evapotranspiration, cutbacks in groundwater recharges, and in case of poor waste water management, also increased pollution loads into ground and surface waters.

While dealing with the above components, the process of integrated planning at watershed level has to fulfil a set of objectives and follow a number of steps. One could look at the watershed management objectives in a cascade fashion, with overarching aims representing the integrated approach and subsequent specific objectives, focusing on sectors, ecosystems, or natural resources, so a to give way to the concrete actions for watershed development, protection and restoration. There are three interconnected overarching aims: i) achievement of sustainable water governance for sufficient supply of qualitative water for years and generations to come; ii) sustenance of social, economic and land developments for short and long term periods; iii) fuelling of ecological resilient territories and communities. The specific objectives that come out of this overarching frame, will bring watershed management into numerous directions of planning and stakeholder involvement, depending on the variety of natural resources, property rights and institutional organizational systems that manage these resources, together with territories and development sectors.

For instance, Gregersen *et al*. (2007) summarises the watershed objectives based on Brooks *et al.* (1990), as the following: i) Maintain and or increase land productivity; ii) Assure adequate quantities and quality of usable water; iii) Reduce flooding and flood damage; iv) Reduce erosion and incidence of land slides; Reduce downstream sediment delivery. [Government] Agencies also define goals for watershed

management that depending on the institutional and jurisdictional organization can vary from strictly water related, to restoration of ecological balance by harnessing, conserving and developing degraded natural resources (Government of India, Ministry of Rural Development, Department of Land Resources, n.d.), and further more to overall territorial governance as a means for balanced management of human activities and natural resources (Conservation Ontario, 2010).

The steps for conducting an integrated watershed planning process are summarised as adapted from Heathcote (2009) and Randolph (2004):

- Inventory and analysis,
- Identification of problems and prioritization,
- Setting the goals,
- Development of the planning scenarios,
- Screening and evaluation of the management options,
- Development of strategies, actions and procedures.

Inventory and analysis includes the understanding of watershed components, including their features, processes and uses; of stakeholders, institutions and related interests; and finally of space and territorial boundaries of study. Watershed components and stakeholders are broadly discussed above. As far as boundaries are concerned, it is crucial to set the territorial scale from the outset, because the complexity of the water drainage network, basin and landscape escalates with the increase of space. The terms watershed, basin and catchment areas are often used interchangeably in literature (Lal, 2000). However, for the sake of this research, the definition of the spatial difference between the watershed and the river basin shall be understood according Gregersen *et. al*: "We refer to a *river basin* as a large unit of land that drains into an ocean. The term *watershed* is used to refer to smaller units that contain all lands and waterways that drain to a given common point. A river basin can, therefore, contain many watersheds within its boundaries." (Gregersen et al., 2007). So far, literature shows that seems to be easier managing natural resources at their individual scales, at ecosystem level, or at a micro watershed scale. Increasing the territorial scale proliferates significantly the challenge for managing natural resources, due to the arising complexity of biological processes and interrelationships and contradictions on power jurisdictions (local, national, and regional).

This phase will achieve the establishment of the watershed environmental inventory and an analysis of the social, economic and environmental state of the art in the watershed area. The inventory is usually set in a geographical platform, thus consisting of a GIS dataset of natural and socio-economic factors, including land use (Randolph, 2004), that allows for in-depth analysis if the watershed. The analysis will start with a rapid assessment, consisting mainly on data and facts interpretation to conclude with detailed assessments of the current situation, leading to identification of problems.

The *identification of problems* is attained through both, the rapid and thorough analysis carried out in the first step, as well as through stakeholder consultation. The latter is crosscutting to the whole planning process and it is organised in a way that targets all stakeholders and their interests. Problems relate mainly to the use and wellbeing of the natural resources, their interaction with the human made interventions and urban settlements, property rights on natural resources, as well as institutional and legal frame aspects that need to be revised to ensure resiliency of the watershed (and all of its ecosystems) and sustainable development.

Prioritization of problems leads immediately to the *goals setting* step and subsequently to the development of *the planning scenarios,* which not only reveal constrains, but first and foremost propose strategic interventions and decision-making criteria. The criteria are especially used in the *screening and evaluation of the management options*. The latter is multidimensional as it involves a number of tools, such as benefit-cost analysis, [strategic] environmental [impact] assessments including social impact assessment, risk assessment, institutional assessment, etc. The criteria are also multiple and given different weights, ranging from economic to social, environmental, ecological, territorial, institutional, cultural, political governance, and design criteria.

The last but not least, the designation of *strategies, actions and procedures* leads towards management, aiming at organizing and guiding use of land, water and other natural resources of the watershed to provide desired goods and services to people without affecting adversely soil and water resources (Brooks *et al*., 2012). The "integration" dimension is exceptionally strong in this step as the strategy actions and corresponding regulations consider the needs of all sectors (economy, agriculture, natural resources protection, industry, etc.) and carefully recognise the

interrelationships among land use, soil, water and the location of the different areas relative to the stream (Brooks *et al*., 2012).

On a practical level, there are two major approaches used in managing the watershed problems: the structural and the non-structural methods. These may be used separately, or with some crossover, depending on the watershed management objectives, costs and stakeholders` interests. Non-structural best management practices (BMPs) do not usually include construction of facilities; they rather consist of some types of planning, design and vegetation measures. For instance, regional planning and transit-oriented development (Calthorpe, 1993), (Carlton, 2007), design with nature (McHarg, 1992), conservation design, etc. provide solutions and incentives for the protection of natural resources. Similarly, fertilizer and pesticide application control, vegetative filter strips and barriers on agriculture land, impervious area reductions, dune restoration and management, preservation and/or restoration of environmentally sensitive areas such as wetlands, lagoons, riparian corridors, etc. all constitute environmentally friendly practices that protect the watershed. On the other hand, structural BMPs include measures and construction of physical structures to control water quality, have usually higher costs than non-structural ones, but may be able to achieve a significant result in shorter time. Nevertheless, these BMPs are successful in terms of achieving their specific target, but may have other adverse environmental and visual effects, as for instance with sea walls and dykes, etc.

Conclusions

The watershed is a complex territorial unit built around a water body and defined by its stream channel and affluents, the composing landscape and the related ecosystem services. The term can be interchangeably used for river basin, though the latter means an entirety of watersheds, draining into a main river that will finally discharge into the sea. Consequently, the meaning and the scale attributed to the term, will impact the complexity of the interrelationships that rule over the watershed area. Because these interrelationships represent a multitude of interests, values and development perspectives, next to ecosystem values per se, the watershed needs to be planned for and managed in an integral fashion and through comprehensive, yet practical and targeted instruments. The approach that scientists and academics propose is that of integrated watershed planning and management. This approach is widely accepted at a theoretical level, but still weak in terms of implementation and

use by government agencies. A major factor behind remains the power struggle among different agencies and stakeholders over a limited number of resources, located within one single territory, together with property rights rivalries and low understanding of the cause-effect chains of poor, unilateral and narrow-minded natural resources management.

Integrated watershed planning and management embarks on three interconnected overarching aims that bring together water governance, social-economic and land development and ecological resiliency. The specific objectives address target issues through targeted instruments.

Practices used for managing watersheds are often divided into structural and non-structural ones, with the previous consisting of costly and effective but often environmentally disruptive technological solutions, and the latter being environmentally friendly, soft and mainly ecological interventions of a preventive nature, with an arguable efficiency. The choice between the two is of a managerial and political nature, based on benefit-cost analysis, presumably including externalities and ecosystem services valuation.

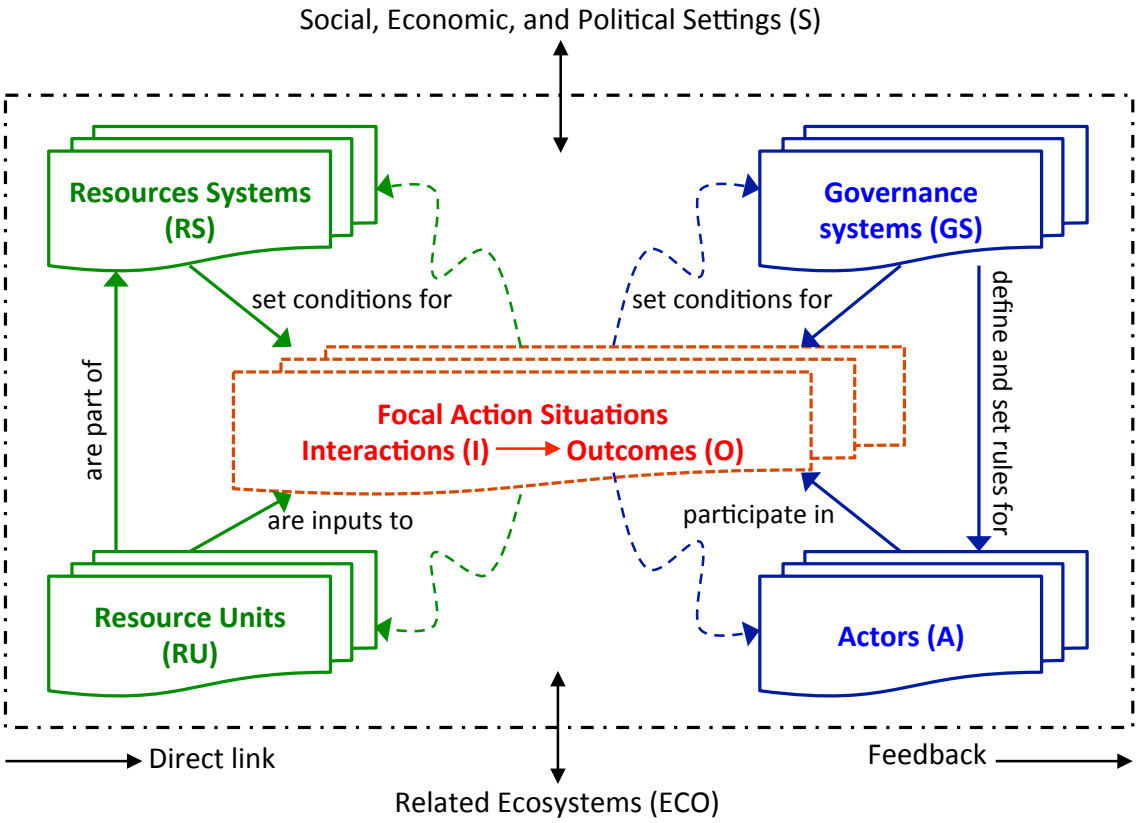
3.5 Establishing a logical frame for the study

The analysis and findings of this chapter constitute evidence for the complexity of socio-ecological systems and the need to continuously engage in thorough studies of socio-ecological interactions that hamper the sustainability of the systems. Ostrom (2007) initially proposed the socio-ecological systems' framework, based on a long process of collaboration with other scholars (McGinnis & Ostrom, 2014). The framework has experienced improvements/modifications by the author herself and by other scholars, who have been using it to their contexts.

The SES framework helps to carry out diagnostic work and analysis of complex systems and processes through offering a multi-tier model, where the macro-components of SES constitute the first tier and further unravelling of these components into hierarchically detailing levels provide for the second and third tiers. For instance, a governance system (GS) is a set of institutional arrangements (including rules, policies, norms, and other governance activities) used by one or more actor groups in their interaction for governing a commons (Fleischman *et al.*, 2014/a). The application of SES framework starts with the establishment of the key

questions related to the research in order to define the level of analysis and proceeds with defining variables to be measured and the communication of the results (McGinnis & Ostrom, 2014). The understanding in each tier is made through a number of variables developed by scholars, a number of which will be made use of in this case for the Albanian forest sector study.

Figure 10. Revised SES framework with multiple first-tier components (McGinnis & Ostrom, 2014)



Source: (McGinnis & Ostrom, 2014)

In this respect, particularly of interest is the vast database of variables developed by the SESMAD[13] project, which intended to explore if variables found important in explaining outcomes on small scale systems could be scaled up to explain outcomes in large scale multitier environmental governance (Cox, 2014). In fact different studies show that key variables that may have influenced a process happening to a CPR (such as deforestation rates, or other endogenous and exogenous context-based variables (Armitage, 2008)) are not well captured in CPR theory. These variables include: the intention of the government's system often recognised as the 'government's practice or intervention' (Foucault (1991) in (Li, 2006/2)) that attempts "to shape human conduct by calculated means" (Li, 2006/2, p.3); the presence of

clientelistic politics; the influences of international politics and markets (interventions as described above); the influence of top-down governance (Fleischman et al., 2014/a); the socio-cultural construct of the stakeholders group, and their ability/intention to self-organise; and the specific knowledge on the ecosystem and on the ways the ecosystem can shape the human behaviour (Armitage, 2008).

Because this research is aiming at understanding what lessons could the success of collective action for natural CPRs bring at the level of conventional governance, in order to achieve forests ecosystems-based governance, then 8 variables corresponding with the 8 design principles of robust CPR institutions will be analysed. However, because the analysis intends to explore the larger scale of CPRs, and preferably a regional scale where ecosystems display their functional natural boundaries, further variables will be added to the analysis. In order to define these other variables, reference is made to the following SES study approaches, as well as research carried out on larges scale commons, by applying a handful of the SESMAD variables.

DPSIR (Driving Forces – Pressures – State of the Environment – Impact – Response) and the Cascade Model (Haines-Young and Potschin 2009 and 2017) are two approaches to study SES, with a particular value in decision-making that intends to take ecosystem services (ES) into account. As described throughout the chapter 3, the balance between the natural capital and the human system is extremely fragile, and resembles that of supply and demand, where the offer of the natural capital is depletable or at best, regenerates at a slower pace than the posing of pressures by the human demand.

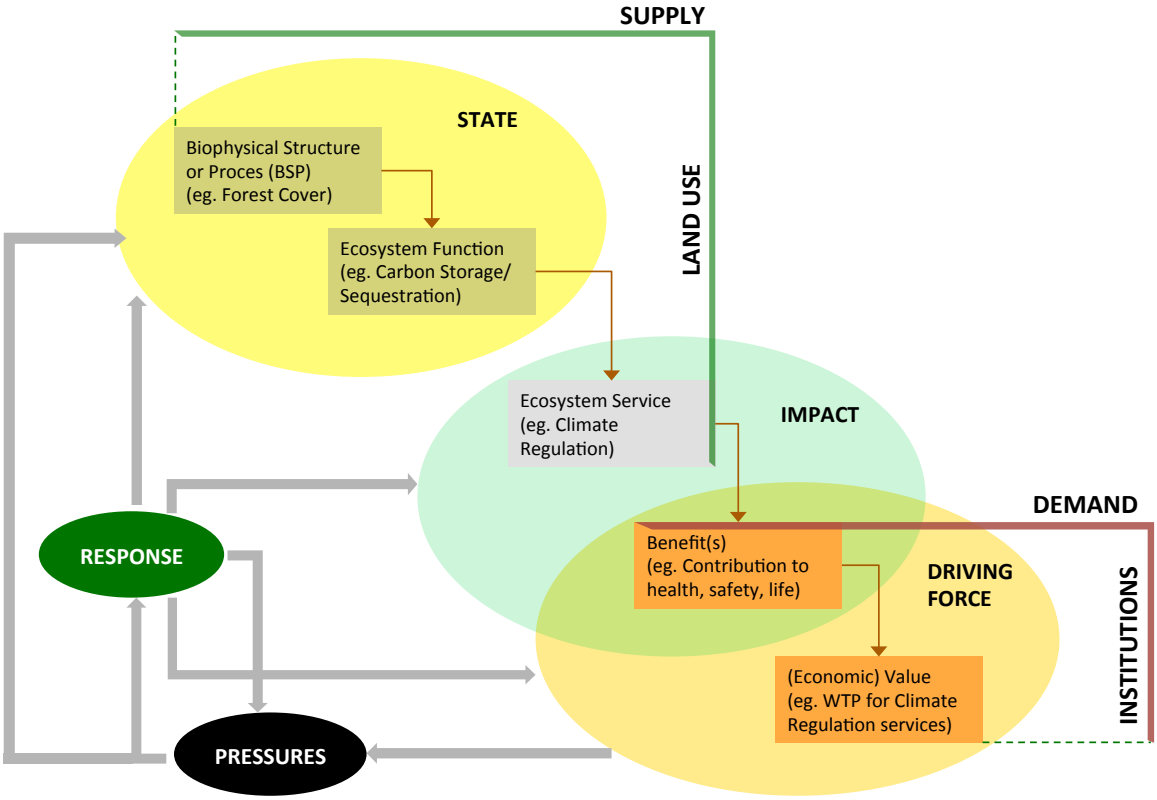
Most ES studies so far have made great advancements in understanding the supply in quantitative, qualitative and spatial terms, for stocks and for flows, for resources systems and resource units, including interactions such as the human use of ecosystem services. However, in order to safeguard the fragile balance between supply and demand, there is a need to develop better knowledge on the demand, which can feed timely and accurately the decision-making process. Demand for ecosystem services is highly dynamic, because of being in continuous evolution (timely and spatially), therefore mapping it is difficult and with unclear relevance. However, it is possible to understand demand and factors that shape and impact it, so that scenario analysis related to ES use is realistic. Thus, there is a need to understand the current demand,

but also forecast future demand, in order to achieve lower pressures to the ecosystem (functions and services).

Through DPSIR is possible to better understand the different processes that affect the ecosystem conditions and their link to human activities (Erhard *et al*., 2017). DPSIR makes for a good approach for studying SES, by showing in a repeating cycle how human interests affect the ecosystems and how this impact affects humans afterwards. It allows for human institutions to intervene (respond) in the cycle for breaking a negative path and keeping the cycle in a proper track, by influencing not only pressures that humans put on the environment, but also the altered state of the environment, or the negative impacts on ecosystems and society. DPSIR is powerful in policymaking processes, as it addresses the full cycle, while trying iteratively to establish socio-ecological balances; it is easily understandable by actors and places an emphasis on the demand side – driving forces and pressures of the human society on the environment. This is particularly important in a context, where mapping the human demand for ecosystem services is not only incomplete, but quite difficult to be achieved. The DPSIR model provides a powerful logical framework, rich in indicators at any step of the cycle, but it does not include mapping of the indicators.

The Cascade Model shows the linkages between ecosystems and [society's] values. The cascade model provides good clues on the missing, or needed balance between demand and supply of ecosystem services. It does so through its set of complex indicators for each ecosystem service that is subject to the analysis. It is intrinsically a supply-oriented approach. The assessment starts with the identification of the ecosystem biophysical features and services and ends up with the ES valuation, based on benefits that the ES may provide to the society. It is a powerful tool for policy influencing in ecosystem governance, as it provides the knowledge, including the spatially related one that stakeholders need to have on ecosystems and their services, prior to making decisions. By being a supply-oriented model, it does not capture the demand for ES as the primary or initiating factor in the analysis. This is one of the reasons why most of the mapping efforts are made on the supply side rather than on the demand side. As a result scenario-analysis and spatial data models do not build on demand but on possible alterations of the supply side.

Figure 11. The interaction between DPSIR and the Cascade Model



Source: Author, inspired by: (Müller & Burkhard, 2012) and (Hein *et al*., 2006)

Other authors have also studied issues related to the socio-ecological balance. Low *et al*. (1999) studied the interaction among 5 socio-ecological variables as they affect the robustness of the system, i.e. the balance between natural capital and human profit (Low *et al*., 1999). It is possible to draw parallels to the approaches. Thus, the carrying capacity of the ecosystem, the stock growth rate and the extrinsic variables can be classified as biophysical structures and process (in the cascade model) and are features of the natural capital. The rate of movement of stock across boundaries corresponds with services, while harvesting rules are strategies defined on the basis of human profit, thus benefits and values derived from the services.

Benefits and values constitute the *demand for ES***,** or differently put, the demand is built around the perceived/expected benefit and its respective value to humans. As the demand is the driving force (DF) for exploiting ecosystem services, benefits and values are the two components of the DF that motivate people to set pressures to the ecosystems. According to MA (2005a), DF includes demographic factors, socio-economic and political factors, scientific and technological advancements and culture, ethics, religion, preferences and lifestyles. Hence, benefits and related values that humans receive from ecosystem services are meant to satisfy the DF, as described in

the diagram and set by MA (2005a). The demand is impacted by the supply – therefore the ability of the biosphere to provide the services, and by the institutions. Knowledge on the supply is expected to affect the behaviour of the governance models (both CPR and conventional governance).

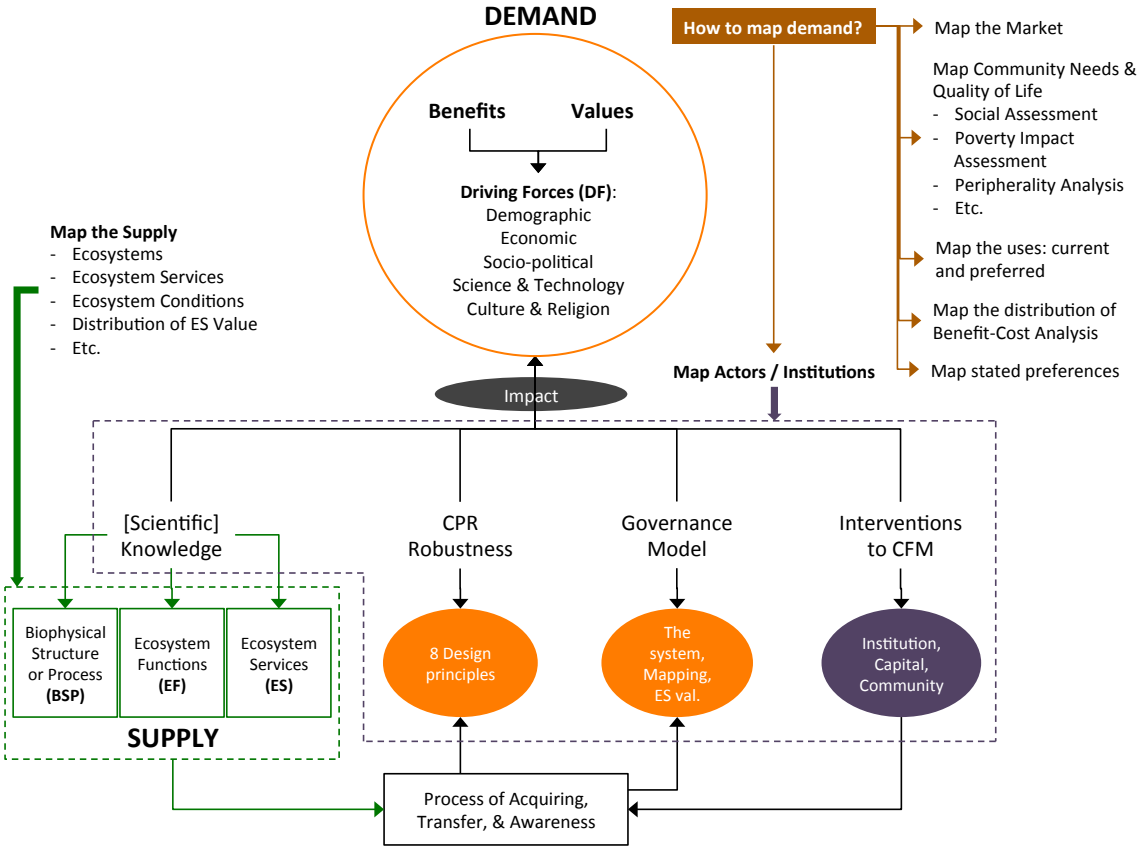
On the other hand, the institutions 'act' as responses, or constituents of responses towards the DF. According to Elinor Ostrom, "institutions are essentially "rules of the game" that facilitate, guide and constrain the conduct of individuals and organizations" (Hoffman & Ireland, 2013, p.4); (Ostrom, 2005), and may encompass the government regulations, social codes, businesses and community rules, from the very local to the very global scale (Hoffman & Ireland, 2013). In the following diagram the institutions are provided as a set of 4 variables: a) knowledge that the scientific community and all other stakeholders have on the ecosystem – on the biophysical structures or processes, ecosystem functions, and ecosystem services; b) the governance model, composed of a conventional governance system and a community governance system, which in the case of natural resources corresponds with commons' regimes, or CPRs systems; c) interventions to the community governance system – in the case of forest commons this would be interventions to the community forest management (CMF). Interventions made to community management of natural resources will change the final behaviour of CPR institutions and government institutions regarding the exploitation of the resource. The types of interventions were already explained in section 3.1.

The following diagram provides a simple visual explanation of the linkages between DF, the 4 impact variables and the factors that shape demand. The model shows once again that a balance between supply and demand is needed and one of the means to achieve this is regulation of scale mismatches through adjusting and adapting governance mechanisms, hence creating synergies between governance models/systems on a multitier scheme.

This requires for the mapping process to extend beyond the supply and encompass also the demand, or the DF. As explained above, DF/demand, are dependent on the society/community/individual quality of life and needs. Therefore, poverty, education, utility enhancement intentions and freedom are overarching items shaping demand. It is possible to map at least the first three by using social [impact], economic and

market assessments and statistical data, therefore leading towards at least a partial understanding of demand scenarios.

Figure 12. Conceptual framework towards achieving balance between supply and demand for [forest] ecosystem services – how to link ecosystems' governance with its territorial dimension



In conclusion to the theoretical discussion and the above framing, theories and concrete work on ecosystems (services, rights and institutions) provide an ample ground for discussion and solutions that are ready to be employed in policy decision-making, while also leaving room for further research. So far, the ecosystem services research has had more focus on raising scientific knowledge about ecosystems and their services. This is a precious work that constitutes a significant on-going body of research in the field of socio-ecological relations and systems. On the other hand, less focus has been placed on the demand or the driving forces; perhaps because it may be more difficult, or because there is still so much thirst in understanding ecosystems.

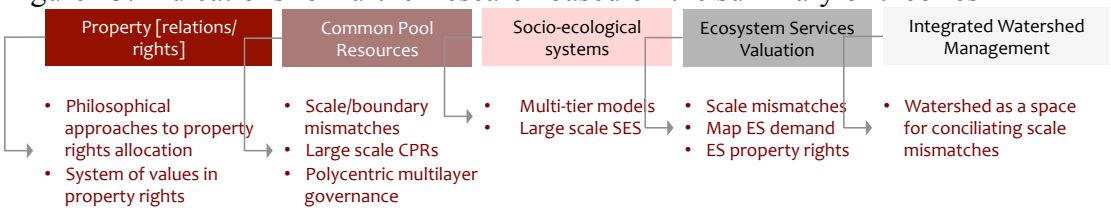
Table 3. A summary of main theories that deal with the natural capital from specific perspectives and respective non-exhaustive indications for further research

Theories	**Focus of research**	**Indications for further research (not exhaustive)**
Property theories	The definition of property beyond the simplistic meaning of the lay people, to	Employment of philosophical approaches to understanding

	include relations and the "thingness" of property; understanding of property in the frame of broader world philosophical approach; the "bundle-of-rights" metaphor for property; property as a right or as a means; types of property rights.	property in the management of natural resources and especially in CPR institutions.
Common Pool Resources theories	The recognition and definition of common pool resources as a type of goods (accessible and subtractable) and recognition of the existence of institutions that successfully govern CPRs. Types of property rights on CPRs – unravelling the bundle-of rights metaphor for CPRs. Identification of attributes that favour the development of communal property rights; conditions for a good performance of the CPR systems; factors that contribute to the manageability of CPRs; indetification through observation of 8 general institutional regularities among robust commons' systems labelled as "design principles". Interventions that happen to CPRs on an ecosystem level, institutional level and strategy choices. Jumping from small CPRs to large scale CPRs – the nested enterprise, the polycentric governance.	**Scales mismatches** appear on a number of aspects: CPR physical **boundaries** – i.e. the boundaries of the natural resource/s do not necessarily match the users and beneficiaries/ impact bearers' boundaries. Furthermore, those who intervene to the CPR system represent a different type of (institutional) boundary. Can the 8 design principles defined for small scale CPRs be use to study **large scale CPRs or CPRs that have large-scale impacts**? CPR institutions do not necessarily consider ecosystem services in their decision-making; at least not in a rational thinking. The nested enterprise and CPR **polycentric / multi-layers governance** is yet to be explored and could prove useful for large-scale commons.
Socio-Ecological Systems	Definition of SES and the institutional framework to study SES; the study of human-environment interactions. Study complex socio-ecological systems through a multi-tier framework. Development of models that through an increased number of variables study complex SES and attempt to analyse the large-scale commons.	Further need to expand the research on using **multi-tier models** for studying large scale commons and increasing the number of observed large-scale CPR cases at an international scale; Observe and analyse the ecosystem services approach in large-scale commons.
Ecosystem Services [Valuation]	Understanding ecosystem services and their link to biophysical structures, processes and functions of the ecosystems. Different research streams focus on the overarching concepts, or unravel the concept for the various ecosystems and categories of land use land cover; Creating a common terminology of the ecosystem services approach, based on a common understanding of flows and processes and based on dynamic research processes; Establishing and measuring Indicators	Further detailed information on ecosystem services, so as to support evaluation and mapping Further work on multiple ecosystem services (valuation, mapping, scenario building) **Scales mismatches** – spatial and temporal Relation to the policy-making and planning Further on the evaluation: new tools and evaluation at small scale

	for ecosystem services, preferably using a multi-tier approach as developed by Ostrom and colleagues in the SES studies; Mapping ecosystem services through apply different tools and techniques and providing a spatial distribution and visualisation of related indicators and flows. Efforts in identifying and linking service provision units with service benefiting areas, to avoid scales mismatch; Valuing ecosystem services – establishing a discourse on the values reference system, raising a debate between anthropocentric and biocentric values; calculating the total economic value of ecosystems, or focusing on specific types of values and calculation tools. Exploring valuation of multiple ecosystem services. Assessing the effect of scale on the valuation process. Linking valuation to policy-making decisions.	Further on the mapping, especially for ecosystem conditions and ecosystem users/stakeholders and institutions. **Mapping of demand and drivers** in order to improve the link between the ES approach and policy-making. Understanding the relation between **ES and rights**
Integrated Watershed Management	Shifting of concepts – from a boundary to an area of complex human-natural relationships and interactions – the watershed as a complex SES and large-scale common. The establishment of an integrated approach towards the study and protection of the watershed. Recognition of the watershed as an intermediate scale between local action and interests and global action and impacts.	Ecosystem services management in a river basin scale – ES assessment does not appear as yet as a routine step in IWM. The river basin as a complex and multiple ES common pool resource – the concept is present in literature, but little evidence of analytical and research work exists. Need to engage CPR institutions in IWM as a means to achieve IWM intentions. **Scale mismatches** with the administrative and political subdivisions – **the watershed as a reconciliation space**.

Figure 13. Indications for further research based on the summary of theories



Still, exploring further the demand, the driving forces and the institutions/stakeholders behaviours is highly important in understanding the humans' side of "using ecosystem services". The CPR theory and the SES theory have made great contributions towards analysing and understanding relations between ecological systems and humans. However, scholars working these theories have made limited use of them in

understanding large-scale ecosystems, CPRs and SES. This is of course on-going work, but it enlightens the fact that contributions from CPR and SES work could be well utilized to analyse the demand for ecosystem services, hence to unravel further the demand side in the cascade model and the DF component in the DPSIR model. Referring to the conceptual framework diagram (figure no. 12), this would among others involve mapping of the institutions/stakeholders (as well as their interests, interlinks, behaviours) that impact the demand and through their action shape the driving forces.

In the case of this research, due to time limits and breadth of the scope of research set by the conceptual framework diagram (figure no. 12), its unravelling will be pursued for some of the components, namely: i) the CPR robustness; ii) the governance model; iii) the interventions to CMF; iv) the process of acquiring, transfer and awareness; and iv) driving forces. The analysis of the 8 design principles and all SESMAD variables will be used to study the first three components. In order to analyse and understand the 4th component, a mapping of ES supply-demand budgets will be made, based on Corine LULC layers and following the methodology of Burkhard and Muller (2015). Finally, the analysis of the 5th component will draw information from the ES supply-demand budgets mapping and will make use of the DPSIR model. The natural resource at focus is forests in the Shkumbini river basin.

Forests are mainly considered in literature as small-scale common pool resources, therefore the applicability of the Ostrom's 8 design principles is easy and appropriate. However, forests constitute a typical ecosystem, where multi-scales and multi-levels interest cross or clash. A very limited number of commoners, or even a single owner may own a forest ecosystem, but its services have at least a regional effect if not national, or global. For this reason, each country governs forests through a myriad of systems and instruments. Environmental problems resulting from forest management are often large scale. Cox (2014) lists degradation of the ozone layer, deterioration of migratory fish stocks and pollution of international watersheds as some of these common large-scale environmental problems (happening on large scale commons). However, the regional or national scale is also medium-to-large scale and in forest management this implies the entirety of forest ecosystems within a functioning space/scale, such as for instance a river basin, or a watershed.

Referring to the SESMAD method, it is necessary for the relevant population of the

case to have at least one governance system, actor group and resource interacting with each other and a sufficient geographic and organisational scale (above 10,000 km^2 or more than 100,000 individuals) (Cox, 2014). The Shkumbini river basin is the area of study in this research. It has an area of 2,444km^2 and a population of around 350,000 inhabitants (INSTAT, 2016).

The variables that the research will explore are listed in the following table and are divided in three groups:

a) Ostrom's 8 design principles for CPRs – key to studying forest commons because as Barns *et al*. refer to Gardner *et al.* (1990) and Dietz et al. (2003), from a CPR lens, dealing with appropriation and provision (A&P) dilemmas i.e. avoiding overharvesting and underinvestment of the CPR, requires collective action of the CPR users (Barnes *et al*., 2017). For the study of the 8 design principles, reference is made to the methodology of Kluvánková and Gežik (2016), Brnkal'áková (2016), COST FP1201, based on previous work done by Poteete *et al.* (2010), Heinrich *et al*. (2004), Kluvánková-Oravská (2013) and Premrl *et al*. (2015) as referred by Kluvánková and Gežik (2016). There are three new additions appearing in the above table in this group of variables – the principles 1A, 4A and 5A referring to the methodology of Fleischman *et al*. (2014) and are particularly listed, because: the study of boundaries from an integral approach is in the aim of this research as presented in section 2.4 – objectives of research; it is in the purpose of the research to verify the external interventions to the commons system and explore for synergies between the commons' and conventional governance systems. The analysis of the 8 Ostrom's principles takes place in two forms: an in-depth analysis that follows the methodology and definitions of Kluvánková and Gežik (2016); the analysis that is based on the definitions of SESMAD. This provides the opportunity to introduce the Albanian forests commons' system to both the comparative analysis of forest commons undertaken for a number of European countries and to the SESMAD cases.
b) Design principles used in the Fleischman *et al.* (2014) referring to SESMAD database – necessary to ensure comparison to other international cases on large-scale ecosystems.
c) A selection of other SESMAD database variables – chosen to increase the

knowledge on the Albania's case and complement the 2nd group of design principles; to increase understanding on the governance model, the demand side or driving forces; to enable of learning from CPR theory for the conventional governance and possibly provide clues that help in resolving the scale mismatch; and to portray whether a multi-tiers governance system exist and what are the features it employs.

The definitions for each of the variables, based on both Kluvánková and Gežik (2016) and SESMAD are provided in the tables 9 and 10, in the Annex 3 of the document. The following table lists all of the variables/principles, providing also an explanation about which SES component each variable belongs, the relevance to DPSIR and Cascade Model and finally the link to the logical frame of the study as shown in figure no. 12. These linkages are made to support the further study of each principle/variable in the case of the Shkumbini river basin from the perspective of the logical framework of the study, building on the DPSIR and Cascade models.

Table 4. The Variables of research and their linkage to the DPSIR model, the Cascade model and to the logical frame of the study

No.	**Design principles/Variables**	**Component as per SES and SESMAD**	**DPSIR relevance**	**Cascade Model relevance**	**Link to log. frame fig.10**
CPR design principles					
1	User rights – well defined boundaries	Actor	Driver and pressure	Institutions and Demand: Benefits and value	CPR Robustness
1A	Biophysical boundaries	Environmental common	State	BSP	Scientific knowledge
2	Proportional equivalence between benefits and costs	Actor	Pressure and impact	Institutions and Demand: Benefits and value	CPR Robustness
3	Collective choice arrangements	Governance system	Response	Institutions and Demand: Benefits and value	CPR Robustness
4	(Self) Monitoring	Actor	Response	Institutions and Demand: Benefits and value	CPR Robustness
4A	External monitoring	Actor	Response	Institutions and Demand: Benefits and value	Interventions to CFM
5	Graduated (self) sanctions	Actor	Response	Institutions and Demand: Benefits and value	CPR Robustness
5A	Graduated (external) sanctions	Actor	Response	Institutions and Demand: Benefits and value	Interventions to CFM
6	Conflict resolution	Actor	Response	Institutions and Demand: Benefits and value	CPR Robustness

7	Recognition of the forest regime	Governance system	Response	Institutions and Demand: Benefits and value	CPR Robustness
8	Nested enterprises		Response	Institutions and Demand: Benefits and value	CPR Robustness
Other design principles[14]					
9	Dependence on the Resource (economic dependence)	Actor	Pressure	Benefit	Demand
10	(Actor) Group size	Actor	Response and pressure	Institutions and Demand: Benefits and value	Demand
11	External disturbances	Governance system	Driver and pressure	Benefit/Value or Ecosystem Function	Interventions to CFM and/or supply
12	Resource characteristics	Environmental common	State	BSP	Supply and scientific knowledge
13	(Common) Political power and civil society	Actor	Pressure and response	Institutions and Demand: Benefits and value	Governance model
14	(Actor) Scientific knowledge	Actor	Pressure and response	BSP, ES, EF	Scientific knowledge
15	Governance system effect	Governance system	Driver and response	Institutions and Demand: Benefits and value	Governance model
Other variables[15]					
16	Actor adaptive capacity	Actor	Response	Institutions and Demand: Benefits and value	CPR robustness
17	Actor traditional knowledge	Actor	Pressure and response	BSP, ES, EF	Scientific knowledge and CPR robustness
18	Ecosystem service management	Actor	Response	BSP, ES, EF, benefits & value	Governance model
19	Economic heterogeneity	Actor	Driving force	Value	Demand
20	Leadership	Actor	Driving force	Institutions and Demand: Benefits and value	Governance model
21	Leadership authority	Actor	Response	Institutions and Demand: Benefits and value	Governance model
22	Livelihood alternatives	Actor	Driving force	ES, benefits and value	Demand
23	Property regime	Actor	Driving force	Institutions and Demand: Benefits and value	Demand
24	Property security	Actor	Driving force	Institutions and Demand: Benefits and value	Demand
25	Cultural heterogeneity	Actor	Driving force	ES, benefits and value	Demand
26	Technology role	Actor	Driving force	Institutions and Demand: Benefits and value	Demand
27	User group external	Actor	Driver and	Institutions and	Intervention to

	support		response	Demand: Benefits and value	CFM
28	User-commons proximity	Actor	Pressure and response	Institutions and Demand: Benefits and value	CPR robustness
29	User group well-being change	Actor	Driving force	Institutions and Demand: Benefits and value	Demand
30	Commons heterogeneity	Environmental common	Pressure	BSP, EF, ES	Scientific knowledge and supply
31	Commons spatial extent	Environmental common	Pressure	BSP, EF, ES	Scientific knowledge and supply
32	Provision services conditions	Environmental common	State and impact	BSP, EF, ES	Scientific knowledge and supply
33	Regulating services conditions	Environmental common	State and impact	BSP, EF, ES	Scientific knowledge and supply
34	Cultural services conditions	Environmental common	State and impact	BSP, EF, ES	Scientific knowledge and supply
35	Centralization	Governance system	Driver and response	Institutions and Demand: Benefits and value	Governance model
36	Governance system age	Governance system	Driving force	Institutions and Demand: Benefits and value	Governance model
37	Governance system description	Governance system	Driving force	Institutions and Demand: Benefits and value	Governance model
38	Governance system spatial extent	Governance system	Driving force	Institutions and Demand: Benefits and value	Governance model
39	Horizontal coordination	Governance system	Driving force	Institutions and Demand: Benefits and value	Governance model
40	Institutional diversity	Governance system	Driver and pressure	Institutions and Demand: Benefits and value	Governance model
41	Social-ecological fit	Governance system	State	BSP, EF, ES, benefits & value	Scientific knowledge
42	Policy instrument	Governance system	Pressure and response	Institutions and Demand: Benefits and value	Governance model
43	Type of formal governance	Governance system	Driving force	Institutions and Demand: Benefits and value	Governance model
44	Transaction costs	Governance system	Pressure	Value	Demand

Source of variables: Kluvánková and Gežik (2016) based on Ostrom (2007)(2009); Fleischman *et al.* (2014); SESMAD database https://sesmad.dartmouth.edu/variables.

Boundaries are core to this research and appear in several of the variables of the table no. 4. The study of boundaries will focus on the following: 1) Boundaries as defined by Ostrom's design principles for robust governance; 2) Analysis of spatial and

temporal boundaries of forest ES; 3) Analysis of the forest ecosystem administrative spaces (local, regional and national) in terms of gaps and overlaps, convergences and viability of implementing, or borrowing from the commons' self-governance successes. The information is derived from desk review (legislation, strategies and reports) and from fieldwork (interviews with foresters, forest associations, forest federation, forest departments in the municipalities and national agencies as well as from visual surveys).

The selection of the respondents is as exhaustive as possible given the time circumstances. This means that it is not possible to interview donors – people who managed the donors' projects 10 or 15 years ago are not working anymore in Albania. The information on the donors' interventions can be accessed through documents (desk review) and interviews with involved stakeholders, i.e. municipalities, forestry officials, users associations and forest experts. Hence, all government actors at local and national level are selected for an interview. Then all of the existing cases of forest commons within the basin are also selected. For each case, one focus group with the presence of the commoners, the municipality officials and heads of the forest users associations has taken place. A pre-screening of the commons' cases shows for their presence in at least 30% of the forests in the Shkumbini river basin, hence showing for a significant weight of this form of governance territorially and institutionally speaking. The number of the commoners present in the focus group depends on the total population of each case. In some of the cases the whole population is present as the total number of commoners is small (up to 10 families). In other cases, a representation of at least 10% of the population is aimed for.

From a theoretical perspective, the use of the 8 design principles is safe as it is already deeply researched, with several cases observed world-wide and several scholars that continue working on and feeding the CPR theory. Limitations may arise on a practical level, depending on the willingness and readiness of the respondents to provide information during interviews and focus groups (broad research methodology described in section 2.5). The use of secondary data and reports will help overcoming this limitation in case it will be present.

One of the risks/limitations in using SESMAD is the ability to develop a common understanding and interpretation of the variables to that of the scientists that developed those variables. The SESMAD manual helps in overcoming this limitation.

The intention of providing answers to the larger-scale problems constitutes at the same time another limitation – the larger the scale and more levels and actors included, the higher the complexity and heterogeneity (Cox, 2014). Developing a framework of study (figure no. 12) through a step-by-step approach (by reflecting on different approaches and models) is helpful in overcoming this limitation. Time remains a final limitation – the forest governance system/s here described are in a continuous changing process. It is possible to analyse the past trends and draw future ones, but there is no clarity on the government side of how the system will finally evolve. As the research is expected to reveal, the whole system lives through a very dynamic transformation. In order to overcome this limitation, the research will finally try to identify those elements of the system that have proven successful in time and purpose, are rather solid and consistent and, based also on literature and international experience, are safe to maintain and propose to a newly modified system in the meantime.

A final limitation may arise from the availability and quality of information for some of the variables selected from the SESMAD database, mainly those that require mapping or statistical information. In order to overcome mapping problems, use of Corine database on forests and land use/land cover in general will be made. In order to provide a higher level of detail in some cases, use will be made of land use maps and planning database developed by the author of this research and colleagues during previous work on some of the municipalities constituting the Shkumbini river basin.

In conclusion, there are a few gaps that this research is aiming at exploring in the Albanian case of forests governance: (i) Linking policy-making with ecosystems' governance is still far from complete (Ring & Mewes, 2015). As a result, either form of governance, though institutionally robust, may experience serious failures in terms of properly addressing the human-nature interaction. (ii) The study of the natural CPRs shows for success of self-governed ecosystems. Still, this success is valid mainly at the smaller scale of the ecosystem, without considering the larger scale of the external resource users or ES impact bearers, thus the full array of the ES that the ecosystem provides. This larger scale is what conventional governance is dealing with and its complexity is even higher under the globalization pressures. (iii) The capability of various governance forms to resiliently self-adapt, learn by doing and from each other can feed multi-layers governance. Still the latter will have to solve

the “overlapping boundaries” issue, considering that boundaries are spatial, temporal, institutional, and scalar. The above conceptual framework and methodology is aiming at dealing with these research gaps.

The following chapters constitute the empirical study of the theoretical concepts in the case of Albania and more specifically the Shkumbini river basin. The empirical study will deal with forest governance in Albania. This includes the analysis of the institutional and legal framework for forest governance, the discussion on forests as ecosystems in the Shkumbini river basin, the discussion on the 8 design principles of robust forest CPR governance and the discussion of the large-scale socio-ecological systems through the unravelling of a number of variables. In conclusion, a summary of findings is presented, together with conclusions on the challenge of the macro-scale, the mainstreaming of the ES in the CPR model, and the challenges of Albania in forest governance. A last thought is also given to the opportunities for further research at national and international level.

The interest for conducting this research is purely out of an academic and scientific interest, it is not based on any predetermined position and it has not any conflicting interests.

IV. Forest Governance in Albania – Shkumbini river basin

4.1 The analysis of institutional and legal framework for forest governance

For centuries, Albania's forests land cover has been significant in terms of size and biodiversity. Prehistorically, forests did cover the whole territory, but overtime this pattern changed into around 50% of the territory, with almost all forests located in the mountainous areas. Unfortunately, most of the information on the use of forests in the past centuries can be tracked either through histories in literature and folklore, or through foreign documents that record trade of timber from Albania, since at least the 16th century (Muharremaj, 2003).

There are however few key exceptions. Thus, the customary social codes of a self-organised form of governance that existed in Albania before and during the dominion of the Ottoman Empire, known as *Kanun*, contained also provisions on the governance of forests and pastures, considering them under two ownership regimes, namely: private and common. The users of the common forest had proprietary rights, if we refer to Ostrom's terminology, thus being able to access and manage it, exclude whoever did not live close to the forest from using it, and harvest its produce (Gjeçovi, 1925)[16]. The users could not alienate the common forest, though it belonged to [all of] them (the village as the respective boundary (Gjeçovi, 1925)), because alienation was simply non-relevant for common property. People followed the Kanun as the traditional system of provisions on self-governance for centuries during Ottoman Empire, though this was not an official ruling law for Albania.

In fact, it is only after 1912[17], that Albania had its own first law on forests and pastures management (Ministria e Ekonomisë Kombëtare, 1930). The governments drafted this law, as well as the whole Albanian state legislation, based on the best European practices of the early 20th century. During this period, the forests ownership was organised into three categories: private; municipal; and state property. The private forests were organised into 4 sub-categories, while the municipal forests were those traditionally shared in common by the people of a village, a city, or a group of villages and used for their provisioning services. Forests that could not be classified

under any of the private/communal categories were then classified as state owned forests (Ministria e Ekonomisë Kombëtare, 1930).

Since its establishment, the Albanian system for forest governance has not remained constant over time. One may claim that certain degrees of variation for a forest governance system are normal and probably needed. In the case of Albania one would also notice that the system has experienced severe abruptions in particular moments, leading to extreme alterations, triggered either by major socio-political transformations, or by the lack of experience and coherence in forest management. The previous are what Pejovich (1990) calls the exogenous reasons, where the variations to the institutions and relevant legislation on forest management are influenced by ideological change (Pejovich, 1990). As a result, the system has [fully] altered its rules in order to be adapted to the change driving factors and conditions. In the case of "lack of experience and coherence" factor, the reasons for change are endogenous, because the stakeholders in the system have requested for new rules to be in place (Pejovich, 1990). It is interesting to notice though, that the exogenous factors have created the conditions for the endogenous ones to be shaped so as to fit with the respective ideological (and social-economic) revolutions.

Table 5. The changing path of Albanian forest governance, factors of change, rationale and gaps

Phases	**Factor of Change**	**Rationale**	**Gaps**
1945-1990	Command-and-control governance system	Socio-political reforms after the second world war – the socialist camp.	The connection between the forest ecosystem and forest users was lost. A centric model of governance was established, resulting in the classical model of 'government shaping human behaviour and norms'.
	Agrarian reform for forest nationalisation	As a policy objective of the new socio-political system. Nationalization of all property was a key feature of the new society and state.	No system of forest commons. No ecosystem protection principles in forest management. Substantial forestland converted into agriculture land – most of it currently abandoned and out of use.
1992-2005	Agrarian, forestry and property/land restitution reform	In the process of land restitution, transfer portion of forest areas from government's management and ownership to private ownership – As a result a limited number of private forest owners emerged, because forest restitution was made cautiously, in contrast with urban and agriculture land restitution. Still	The reform was not concerned with the following governance model on forests. It had a mere target of property restitution, without clear policy objectives.

		there was need to increase the numbers of players in the sector so the law (to a lesser degree) and donor projects promoted the commons system with proprietary rights.	
	The law	Draft and adopt legislation that is compatible with the new governance and socio-economical and political system. Adopt forestry legislation that addresses the new types of ownership.	Lack of ecosystem-based management principles; Lack of proper regulation for the common forest governance system and vague recognition of the opportunity for CPRs. Unable to predict stakeholders' behaviour towards forests in a market economy.
	Freedom of movement	Connect natural and human resources in a system of market economy. Increase the efficiency of public services and infrastructure by concentrating most of the population around few centres rather than have an equal distribution of the territory. Allow for basic freedoms to develop.	The human initiative to move freely and reshape urban territories was not followed timely by a proper response with affordable housing and public services and infrastructures. The government did not prepare a policy to guide or follow demographic changes. Urbanisation in the form of urban sprawl happened on natural and forest land, next to agriculture land. This has led to forestland fragmentation. Furthermore, several 'new forest owners' chose to live in urban areas rather than in rural settlements close to the forest.
	Privatization and licensed rights system of forest management	Undertake and facilitate economic reforms for market liberalization. Increase opportunities for business development and capital formation.	Several functions were turned over to the private sector through a licensed rights system: logging, reforestation, sawmilling, and timber export. Skills and knowledge were often weak and government control was lagging behind, leading to corruptive behaviours in the logging and timber export industry and hence to deforestation. The privatization did not include or address the formalization of a CPR forest governance, at least with proprietary rights.
	Decentralization of forest governance and CPR	The emergence of democratic principles in governance; The transfer of a part of forests – historical communal forests to local governments as part of the overall governance decentralization and linked to the principle of proximity and efficiency.	CPRs gained little attention in the legislation. Forest property transfer from national to local governments took more than 10 years to complete. The update of the forest cadastre never took place. Several donor projects in favour of community forest management could not maintain the momentum created in early 2000s.
2005-2017	Decentralization of forest	Strengthening democratic principles in governance;	No transfer of funds made available next to the property

	governance and CPR	The complete transfer of forests, apart from the environmentally protected areas as part of the overall governance decentralization and linked to the principle of proximity and efficiency.	transfer and functional decentralization. The forest cadastre update is initiated in 2016, but not yet concluded. For 10 years there has been a spatial mismatch between forest governance and local governance. There has been no proper follow-up of the good results achieved through donor projects on community forest management.
	The law	Revise the law to better reflect the socio-economic system. Strengthen the licensed rights system. Create a stronger sanctioning process.	The CPR still did not gain proper attention in the legislation. The moratorium placed a single penalty sanctioning system.
	Forest moratorium	Bring forest exploitation for export purposes to an end, and halt illegal cuttings.	The moratorium did not address the strengthening of the CPR system as a response towards illegal forest cutting. Illegal activities are still present.
	A new legislation under preparation	Introduce the CPR system; improve the forestland conversion process in favour of protecting forests. Introduce full ownership on common forests.	The law is on hold and the CPR issue and the full ownership on common forests are two major subjects for not bringing the legislation review to a conclusion.

Soon after the 2nd World War, in 1944, the new Albanian Government endorsed a command-and-control system of governance and economic development. Under this framework, it also implemented the Agrarian Reform that nationalised (among others) all forests and pastures. All land, regardless of its use, was state property. All decision-making was centralized and the ruling political party dominated at all levels of society, therefore leading to an overwhelming role of the state in selection of forest policy instruments and policy implementation (Lazdinis *et al*., 2009). Most of the institutional efforts in forest management during 1945-1990 were focused in establishing a new legal base, new institutions for forest management, technical capacities and a balance between afforestation and timber and non-timber harvesting (Muharremaj *et al*., 2009). The latter was not so successful, for two main reasons: considerable portions of the forest area was either deforested and converted into agriculture land, or transformed into orchards and olive groves, still classified as agriculture land; wood was the only house-heating energy source and the demand was significantly high compared to the forest regeneration ability (Muharremaj, 2003). Using the words of Lazdinis *et al.* (2009) when describing their context, in Albania "state forestry was lacking incentives for economically efficient timber harvesting and

forest management in general" (Lazdinis et al., 2009, p.310). A key achievement however, was the establishment in 1948-1953 and update in 1967-1968 and 1984-1985 of the state inventory on forests and pastures, through fieldwork data collection and mapping.

The first law on forests [and pastures] enacted after the change of the socio-economical and political regime of early '90s dates as of 1992. This law brought back the private property on forests and classified public forests under state forest and communal forests. The latter also were state property, but transferred to communities (villages) under user rights, favouring communities that live close to the respective communal forests (GoA, 1992). Trees and coppices in agriculture land were not classified as forest, thus leading towards lower inventory figures and showing for technical and land based forest governance rather than resource based (APFDP, 1998). This law is part of the post-communism transition effort recognised as "transformation of polity, economy and civil society" (Gryzmala-Busse & Luong, 2002, p.529), which, as analysed by Gryzmala-Busse and Luong (2002) has not paid sufficient (if not at all) attention to the state-formation process in post-communist countries, thereby assuming that these countries had inherited a large, but stable and unchallenged administrative framework similar to that of the developed democracies of the West.

In this context of largely unknown, non-analysed, and unstable base of state-formation after 1990 (for Albania), the development of the legislation took place dynamically and in a very short period of time compared to the centuries it took in the western countries. Furthermore it was impacted by the donor's interventions and international pressures, as well as a network legacy of invisible and informal exchanges, able to survive beyond the radical transformation, export itself to the new context and impact elites in a process of competing for authority (Gryzmala-Busse & Luong, 2002). In these very dynamic and rather turbulent circumstances, the formation of legislation was also an unpredictable process, complying with immediate needs and pressures, responding to political changes and powers and being influenced by that inherited informal network which was still there to impact authority formation.

Hence the forestry law of 1992 was abolished in 2005, with the adoption by the parliament of a new law on forests, which gave more space to the articulation of the licensed rights system for non-commoners (GoA, 1992) (GoA, 2005). In response to

the lack of a commons' system and to the priority given to the licensed rights, the National Forests Federation and the forest users associations initiated a lobbying and advocacy process to impact the 3rd wave of forest legislation review initiated in 2014. The process is still going on and apparently is withheld by some government's actors. The latter hold the power of changing rules and in order to allow the continuation and flourishing of the licensed-based system of forest use rights, which brings significant individual profits to selected segments, they limit the power that other stakeholders can exercise in shaping the forest legislation and policies.

The major efforts for decentralizing the governance of the forestry sector initiate as of 1995 and take place initially with the support of the Albania Forestry Project (World Bank, 1996-2004) and Albanian Private Forestry Development Program (USAID, 1995-2001). Both projects focused on enhancing decentralization of forests governance, by working with public institutions and communities to increase their capacities, promote stakeholders' cooperation and trigger a functional private and commons' forests governance. The projects provided funds for investments on forests regeneration and services and had poverty alleviation as an objective. It is in those years that forest communities experienced a certain re-emergence of some of the commons' forestry traditions of the past.

However, commons were mainly re-induced by donor projects, rather than due to a deliberate government policy. There are commonalities, as well as a distinct difference between projects' approaches. Both approaches aim at sustainable community forest management and reducing poverty and improving rural livelihood:

Approach 1) – the WB initiative had local governments (LG) as the primary partner and worked with communities through LGs. Based on legal provisions, it facilitated the establishment initially of about 218 forest users associations[18] (Lako, 2008); (DPPK, 2002); (Bernard et al., 2013) that were set to implement forest regeneration activities, cooperate with the forest extension service and represent users' interests and organise them in the transfer of forests use rights from LGs to the community and/or private owners. Scale/boundary-wise the associations were established on a micro-watershed level, corresponding to the territories of the previous local governments[19]. Referring to Barnes *et al.* (2017) this approach is a typical case of intervention activities directed at forest institutions. The establishment came through a

participatory process and the project was also aiming at transferring knowledge to the forest community and to the newly established institutions as well as providing grant funds for the community and the associations to engage in ecosystem services management. Therefore it resulted also on type 2 intervention activities - those aiming at affecting capital stocks and strategies.

Approach 2) – The APFDP, on the other hand, considered the associations as rather artificial entities and representatives of a top-down approach. The argument was that in a context where commons' systems were shut down for at least 50 years, supporting private forest owners and voluntary exchange to revive the tradition is more appropriate than create institutions aiming at handing back resources to the communities (Saunders, 2014). Therefore it worked closely with selected forest owners, communities and the respective aldermen into achieving similarly the same goals as AFP. ADFDP promoted also the concept of community forest management at micro-watershed level, trying to connect this area to the administrative boundaries of the local governments in 2000s[20] (APFDP, 1998). The aim was to bring forest management from a single community, or owner scale to a larger scale where communities and forest owners could efficiently cooperate with other stakeholders and interest as well. By addressing existing communities and institutions, this approach coincides with type 3 intervention activities of Barnes *et al*. (2017) – aiming at strengthening or altering community institutions for the sake of sustainable community forest management and improvement of the overall rural livelihood. Type 2 activities were part of this approach too and as a matter of fact, these provided more successful results in the long-term compared to type 2 activities.

Both approaches were successful during the project implementation lifetime because of the substantial donor technical and financial support and their leverage power with public institutions, as well as engagement of several experts and NGOs. Furthermore, the governance decentralization strategy and the local government law adopted in 2000 gave an institutional boost to these efforts, which grew further with the second WB financed project, Program for the Development of Natural Resources (2005-2012). This 2nd program, was aiming at reducing poverty in the rural [mountainous] areas, by engaging communities and local governments into sustainable forests management through silvopastoral practices (Mehmeti, 2005) and commons-based forest self-governance. Interestingly, it explicitly embodied the concept of micro-

watershed as an appropriate scale for community forestry (World Bank, 2005). Almost concurrently, during 2010-2014, the Swedish Sida and Dutch SNV financed a project on "Strengthening Communal Forests". The latter was aiming at bringing forward the work of the previous projects, with particular interest in strengthening the extension service. It helped local governments, forest communities and forest users associations to transform the multi-annual management forests plans (drafted with WB support) into annual operational plans.

Currently, since January 2015, the Ministry of Environment is being supported[21] by the World Bank for implementing the Environmental Services Project, aiming at "supporting sustainable land management practices and increasing communities' monetary and non-monetary benefits in targeted Project areas, which are mainly in erosion prone rural upland areas. This is to be achieved through the support of alternative livelihoods and provision of environmental services and through sustainable utilization of wood and pasture products in the long term" (WB ESP, 2017). This project re-brings the concept of watershed forest management and links it to the provision and maintenance of environmental services. It provides grants to the local forests associations on undertaking activities for erosion control and forest maintenance, next to pushing for implementation of payments for ecosystem services and establishment in GIS of the forests database. So far, the granting scheme is being implemented, while the GIS database is in progress (though lagging behind as a process) and PES schemes are yet to be developed. In conclusion it places the focus mainly on type 2 intervention activities as per Barnes *et al.* (2017) – those targeting capitals and strategies, and indirectly addresses also the other two types of interventions – those aiming at strengthening forest institutions and community institutions.

Under the frame of decentralization, the government of Albania undertook a process of [communal] forests property transfer to local governments. The transfer was finalised in 2008, while the process for registering forests in the national immovable property registration system is still slowly going on. The process is quite costly and municipalities can hardly afford it, given their limited budgets. The chronology of the above projects is strongly linked to this transfer process and the forestry sector reform during 1992 – 2005. The projects provided the technical and legal know-how as well as incentive funding, necessary to lead towards a self-governance system for forests.

However, regardless of the projects' remarkable contribution, they did not succeed to inject to the national institutions the willingness to incorporate in the legislation a commons system for governing forests. In practice, due to both donor support and a yet alive memory among rural population on shared forests' management, a system of commons was established and is still alive. This system is hardly reflected in the law and it is somehow regulated through bylaws.

Institutionally speaking forests management has taken place through the Ministry and related agencies at the national level and the municipalities at the local level. Currently, the Ministry of Environment is responsible on forests and executes its role through the forests directorate, the national environment agency (has also a forests' directorate), the forest inspectorate and the national agency for protected areas that is responsible on forests of the environmentally protected areas. In 2013, the forest police was incorporated within the environment inspectorate and in 2014 an inspectorate of forests, environment and water (national and regional) was established (GoA, 2005). This concentration has led towards politicization of the national forest police structure and a mismatch between the role (forest inspector) and the professional background (not related to forest management).

In 2016, the Government issued the 10-years forests' moratorium law aiming at halting the exploitation of timber forest products for internal commerce and export. The moratorium leaves out the exploitation of timber for heating purposes (managed by the municipality for the needs of its own residents), the conversion of forest land-use into other land-use categories and forest cutting for maintenance purposes. The moratorium in itself is very controversial because of lacking further bylaws to regulate its main provisions, being enacted without prior assessment on possible external effects and with no provision of other energy alternatives, and because of the simplified one-rate penalty system. The latter is around 45,000 EUR per violation, regardless of the violation type and size (GoA, 2005). The lack of a graduated sanctions system, next to the lack of bylaws that regulate the use of forest products under the moratorium conditions, has in fact led to either unjust sentences, or to an increase of transaction costs due to higher corruption costs. This is a typical case where as Sundar (2000) and Nayak and Berkes (2008) define, the state government has intervened through imposing inappropriately designed conditions that increase transactions costs and further exacerbate inequities (Nagendra & Ostrom, 2012). In

overall, the real effects of the moratorium are still to be expected and assessed.

The current forestry legislation, enacted as of 2005 has undergone several amendments since. The objective of the law is the protection and sustainable management of the forests in Albania. This includes social-economic, eco-touristic and resource conservation and protection activities for forests, forestland and natural resources in the forests (GoA, 2005)[22]. By simple definition of the objective, this law is aiming at regulating the use of forests as a production economy; the use of land in the forests, thus having a strong link with the spatial planning domain; the governance of ecosystems vis-à-vis the sectorial governance; and the landscape management processes. The object of the legislation is forests and timber and non-timber products. Therefore, the law promotes the integrated management approach, considering also all elements that constitute the watershed territory where the forests are located, and its regulations reveal the value of the forest for human needs. This is a simple, but important reflection of the purely anthropocentric approach of the conventional forest governance in Albania.

The forestry extension service aims at helping and facilitating people (foresters and pastoralists) to engage with examining their daily problems and alleviate them by using forestry techniques within the range of their skills and financial resources. It has to be expected that the extension staff promotes these participatory processes rather than carries them out, and then uses them to help people widen their knowledge into understanding the full array of the services and roles that the forests can provide to their lives and communities (Sim & Hilmi, 1987). Forestry extension was not well developed in Albania, with foresters mainly playing an inspection and police role, while community forest management was not well understood due to lost historical roots during the communist regime (APFDP, 1998).

It would not be fair though to say that the legislation does not consider ecosystem services. In fact, it supports the principles of forest ecosystem governance and it also attempts to regulate a certain horizontal coordination among sectorial legislation and strategies that have forests as a target. For instance, the law highlights the facts that forests are divided into productive and protective, and that forest management plans (a tool required by law) should aim at the resilience of the natural resources and their sustainable use. The forest functions are classified into: economic; ecological; and

public. The economic functions include the provisioning functions, such as timber and non-timber products, including access to hunting. The ecological functions include a multitude of regulatory and support services, such as climate change protection/mitigation, hydrological functions, provision of genetic material and habitat for wild species, thus enhancing and conserving biodiversity, etc. The public functions include mainly the cultural and aesthetic functions, thus those of the cognitive development (Kareiva *et al*., 2011).

From a property perspective, the current legislation recognises two forms of ownership, namely public and private. Public forests are composed of the state owned forests (environmentally protected areas) and the local forests (recently owned by municipalities). The previous cover around 15% of the territory of Albania (National Agency of Protected Areas, 2015)[23], while the latter cover around 82% of the territory. 3% of the forest area is currently under private ownership (Muharremaj et al., 2009) as compared to 5-6% before 1944 (Lako, 2008); (Müller & Munroe, 2008). The forests that belong to the Municipalities are governed either by the Municipality or through a commons regime established at village level. The commons regime is a form of informal governance that is not regulated by law, while common property does not exist. Before 1944, 92% of forest land was state property and 1.5% was communal property (De Waal (2004) in (Müller & Munroe, 2008)).

The total area of forests has decreased overtime. This is a process occurring since at least two centuries and is due to either overexploitation and mismanagement, or deforestation in favour of creating agriculture land. Before the socio-political and economic transition of 1990, the Albania's character as a primarily agriculture economy was reflected in its land use and land-scape over the country. The several societal phenomena that took place in early 1990s, such as the demographic movements, the economic recession and the property (agriculture and forestland) reforms did bring major changes in the landscape. First of all, the agriculture landscape was heavily fragmented due to a politically feasible land reform that distributed the land to the farm workers rather than the previous landowners (Müller & Munroe, 2008). As a result, as Müller and Munroe (2008) report according to the Ministry of Agriculture and Food (2002), 440,000 farm families received around 1.8 million parcels, with a farm household possessing on average 1.5ha distributed over 3-5 parcels. This fragmentation of property was immediately made visible through the

customary traditional practice of land protection and landscape, where each parcel was surrounded by trees (either forest or fruit trees).

Then, in the Shkumbini basin, forest thinning, clearance and land conversion took also place. This process happened in two different stages and with different purposes. Initially, forest clearing was observed mainly on lower slopes and elevations above sea level, far from the national roads, but close to the rural settlements (Müller & Munroe, 2008). Those forests used to be common before 1945. In this first phase, the villagers were locked into forest clearing for subsistence purposes and new livelihood alternatives, as well as affected by the joint refusal of the population towards ex-socialist property. In the second phase, a common concern on protecting the commons aroused, and forest clearing was carried out in farther forests, in higher elevations, with the aim of making commercial profits from timber extraction (Müller & Munroe, 2008). This wave of forest clearing and thinning did not involve only villagers; on the contrary it involved several licensed-rights companies, whose business was to sell wood for household heating (in continuous demand) and especially to export timber (allowed by legislation).

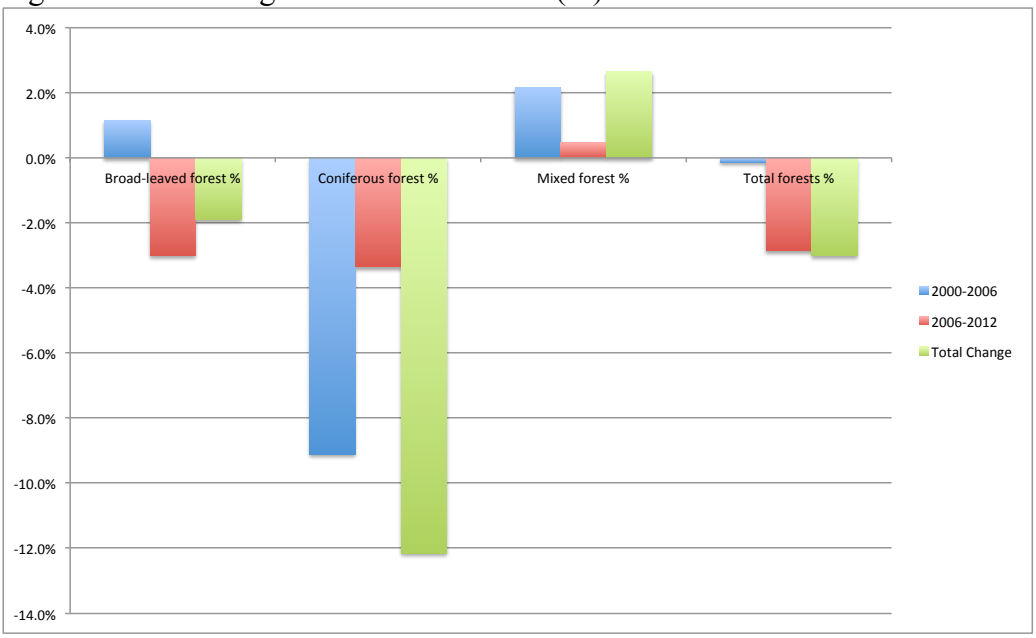
According to Corine land cover[24] data, the forests area has shrank between 2000, 2006 and 2012 by a total of 3% and most of this decrease has taken place during 2006-2012. Below there is a table showing this change in km^2 and two graphs showing the change rate for Albania forests and Shkumbini river basin. However, the challenge in calculating the forest land cover change stands with the fact that any effort for updating the forest cadastre after 1990 is based on satellite pictures, without fieldwork verification follow-up. The information is not thus fully trustful; neither is linked to the prior 1990 databases. Below, the reference is made to Corine as the only database after 1990 that provides time series, by using the same methodology.

Table 6. The change of forest area 2000-2006-2012 based on Corine land cover nomenclature and database

Territory	**Period**	**Forests' Land Cover Change in (km^2)**			
		Broad-leaved forest	Coniferous forest	Mixed forest	Total forests
Albania	2000-2006	73.4	-93.2	8.9	-10.9
	2006-2012	-193.5	-31.2	2	-222.7
	Total Change	-120.1	-124.4	10.9	-233.6
Shkumbini river basin	2000-2006	-4.9	-0.7	2.1	-3.5
	2006-2012	-10	3.8	-0.3	-6.5
	Total Change	-14.9	3.1	1.8	-10

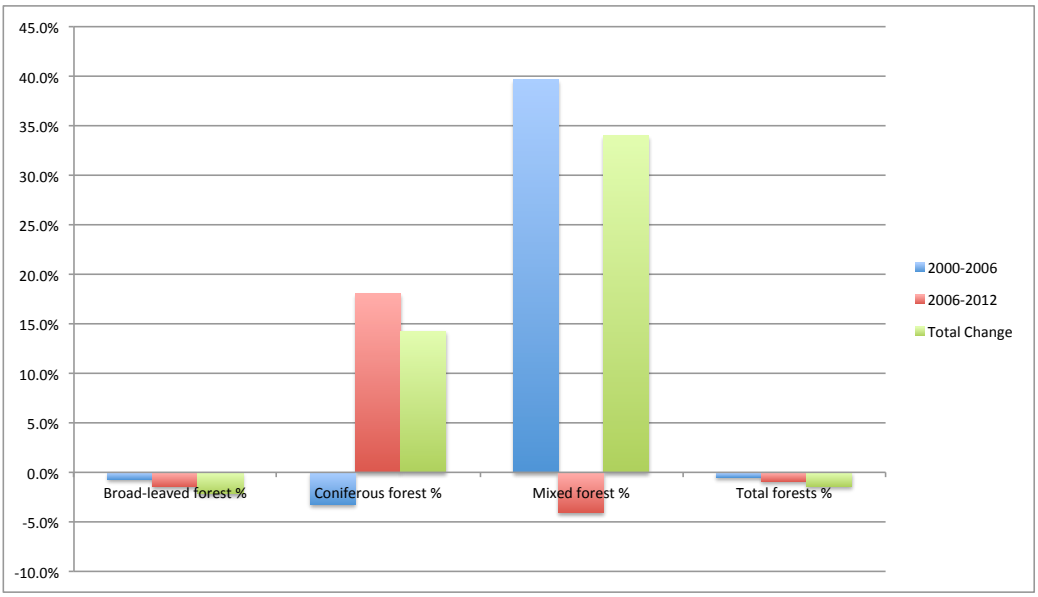
Source: Corine 2000-2006-2012 and own calculations

Figure 14. The change of forest land cover (%) 2000-2006-2012 in Albania



Source: Corine 2000-2006-2012 and own graphical elaboration

Figure 15. The change of forest land cover (%) 2000-2006-2012 in Shkumbini River Basin



Source: Corine 2000-2006-2012 and own graphical elaboration

Besides building its domestic forestry policy, Albania as country that aspires access to EU membership, has to comply with a number of EU requirements, formalised through the Acquis Communautaire, the Association and Stabilisation Agreement, a number of progress reports, and ratifications of European and international conventions that Albania has made over the years. EU awarded the candidate status to Albania in 2014. Since then, Albania is waiting for accession negotiations to open and implementing a number of actions that lead towards the opening of the negotiations.

In the EU accession perspective, forest management is not a direct key sector that the government has to deal with. As it was already provided in chapter 3.3, the forestry sector at EU level is dealt with rather indirectly, through other policies, such as the climate change policy, biodiversity, the agriculture directive, etc. In the frame of the climate change interaction and with the Paris declaration ratification, the government of Albania has committed to lower CO_2 emissions by 11.5% in 2030 versus 2016 (GoA, 2016/c). Albania intends to achieve this commitment by improving forest exploitation technology, doubling wood combustion efficiency and taking on a forestation rate of 500-1,000 ha/year (Toto, 2017) (GoA, 2016/c).

In the frame of agriculture development, forest management is mainly seen as a support sector to help rural people build their livelihood, besides focusing mainly on agriculture, and to provide ecosystem services that are needed for the agricultural development. The national Agriculture development strategy has at least one measure that focuses on forests only, aiming at reforestation, protection of forests, and restoration of damaged forests (GoA, 2013). The National Strategy for Development and Integration has one objective on forest, aiming at strengthening forest management and protecting forest resources, through preventing further illegal cutting from happening, drafting the forest management plans for the whole country and restoring the damaged forests (GoA, 2015/b).

The national strategy on environment is probably the document that addresses forests in the most comprehensive way, with the understanding that the current forestry sector strategy is outdated. According to GoA (2015/a), the intention of the government is to increase the forestland-protected area from 15 to 17% in 2020, prevent deforestation, review the forestry legislation and achieve the full transposal with the European legislation, create the forest cadaster, and include mechanisms such as payments for ecosystem services, and inclusion of local communities in forest management. However, the strategy is not clear about the role that local communities can play in forest governance and the arrangements to make this happen. Forest commons governance is not mentioned by the strategy and appears not to be a focus on a governance level.

From a territorial planning perspective, the local governments propose practical measures for forest protection and manage forestland conversion through their General Local Territorial Plans. So far, 25 municipalities out of 61 have approved

their GLTPs at all official levels. On a national scale, the General National Territory Plan has the ambition to increase the forestland-protected area to 20% in (GoA, 2015/c). Furthermore, one of the spatial development ideas proposed in professional forums is the establishment of green national corridors that will serve as core areas for ecotourism, climate change mitigation and as new alternatives to rural livelihood (Aliaj et al., 2014),

In overall, policy-wise forest management is addressed through the strategic documents of other sectors. An updated forestry development strategy has yet to be prepared. All strategies currently in place hardly mention ecosystem services protection as one of the key objectives of forest management, and do not tackle at all the issue of forest commons.

The system of forest governance development was shortly described and analysed above. Sections 4.3.1 and 4.3.2 will turn back to the discussion of forest governance by focusing on the typology of forest commons combined with the conventional governance model in Albania, for the current legislative and institutional framework.

4.2 Forests in the river basin - the case of Shkumbini

4.2.1 Biological and natural resources characterization

Albania has 7 river basins, composed of several sub-watersheds and their rivers and tributaries, over a steep hilly-mountainous terrain (Muharremaj et al., 2002). Shkumbini river basin is centrally located within the national borders, flowing from the east to the west. The basin has an area of 2,444km^2, a length of 181m for the main stream, and an average slope of 30% that is also reflected in a hydrographical network density of 1.9km/km^2 (Muharremaj et al., 2002); (Pano, 2015); (AKM, 2016). The basin is divided into the upper, middle and lower basin and main river channel, which are quite different in terms of geomorphology, climate, vegetation and biodiversity, soil qualities and fluvial processes. Human activities also differ when moving from the upper areas to the lower ones and this is strongly linked to the topography of the terrain and land productivity. The headwater watersheds and the upper valley are found on altitudes of 1,000m and higher above sea level, with the Valamare mountain peak culminating at 2,373m above sea level and an average altitude of 753m (Lushaj et al., 2000). The glacial lakes in the alpine pastures on the highest altitudes of

Valamare mountain are the source of the Shkumbini river. The other two main tributaries that join the main river channel flow from the glacial lakes and springs in the slopes of Shebenik mountain.

Precipitation and the system of affluents provide to the river a mean discharge (of several years) equal to 62m^3/second and a peak discharge (in 100 years) of 2,500 m^3/second (Lushaj et al., 2000); (Muharremaj et al., 2002); (Pano, 2015). Groundwater sources feed only 39% of the total river flow, while the rest is generated through precipitation and ice melting. In terms of surface runoff, due to having a smaller basin size (therefore catching smaller amounts of water), a long and thin shape (smaller amount of water captured for unit of stream), as well as a significant amount of vegetation – 44% (which is however reducing due to deforestation) of the basin area (resulting into increased lag time) (Cukalla et al., 2000), Shkumbin is ranked as 5th in a hierarchy of 7 river basins, with the first four having values at least twice or higher compared to those of Shkumbin.

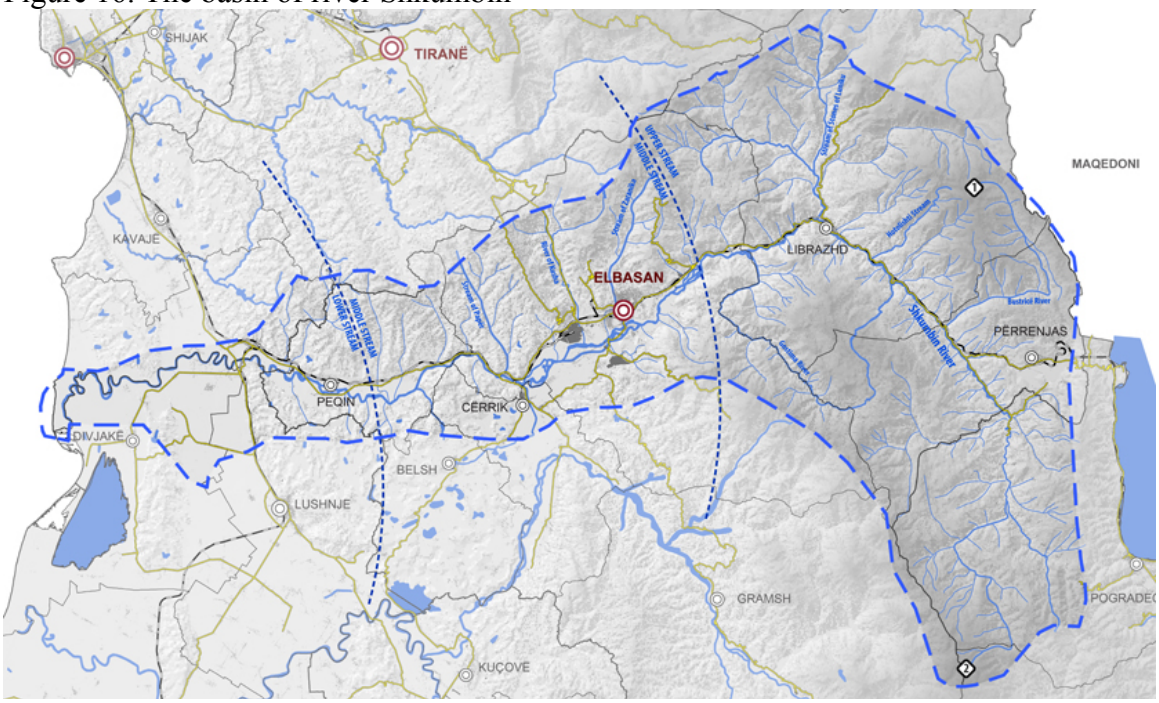
Shebenik and Valamare mountains (the highest slopes of the basin) are both situated on the central-east of Albania and are house to massifs of oak, beech and alpine pastures, depending on the elevation of slopes. Mediterranean macquis[25] is not very typical for the Shmbini valley due to the openness of the valley towards the west and the influence of the colder continental climate (Krutaj *et al*., 1991). The macquis becomes more evident when moving towards the east and opening towards the Adriatic Sea. However, when the river enters the flat terrain of the western coast, the macquis almost disappears because of the expansion of the agriculture activities. The cultivated plants of the alluvial soils in agriculture land include mostly crops and legumes and to a lesser degree also fruits and orchards. Pines and willows cover the belt between the delta and the inland, while poplars are planted along the river, between the embankment and the agricultural plots, in order to protect the latter from erosion. Still, floods have happened along the years and the river channel has moved several times between north and south, in distance of 1.7 to 4.9 km (Lushaj *et al*., 2000).

The valley of Shkumbin has a distinct topographic relief, very irregular, asymmetrical and with accentuated morphological contrasts (Krutaj *et al*., 1991); (Xhemalaj *et al*., 2000). The asymmetry is visible in the unequal development of the valley on both sides of the river, especially in the middle stream – riparian areas and agricultural

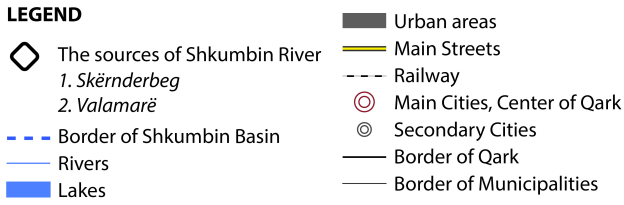
activities exist only on the left, the changing physiognomy of the river terraces and the differentiated progression of the erosion and sliding events. The latter are evident everywhere in the basin, therefore showing for a high risk of the river and soils stability, and distinguishing erosion as one of the major problems to be dealt with in in the basin. The basin's asymmetry is linked to the lithological evolution along the valley. In its lower part, the river flows through a completely flat agricultural area of mainly brown rich soils, with a meandering course, eroding the outer banks and widening continuously the valley.

The climate varies along the valley as a result of the drastically changing morphology and topography from the source in Valamare to the river mouth in the Adriatic Sea. The climate is cold in the upper basin, with winter average temperatures as low as 1.5°C and minimal January temperatures as low as -18°C, and with up to 50 and 70 days of frost in particular mountainous areas (Krutaj *et al.*, 1991). In contrast to these low temperatures, the lower parts of the basin have hot summers, up to a maximum of 40°C (Krutaj *et al.*, 1991); (Pano, 2015). The July averages have increased above 23°C compared to 25 years ago, and this may be attributed to the climate change effect.

Figure 16. The basin of river Shkumbin



Source: Albanian Geological Services Institute 2015, Corine 2012, and own graphical elaboration



A large number of human activities take place in the basin and considerable portions of land are either urbanised (cities and villages), or significantly affected by human use (water, agriculture land, pastures and forests). The abundant natural resources of the basin sustain the life of human settlements and carry out several ecosystem functions and services for humans and other species. However, due to urbanization taking over in several sensitive areas of the basin, population increasing beyond the capacities of the basin to accommodate the need for ecosystem services, exploitation of natural resources from a large number of users – also beyond the basin boundaries, lack of maintenance and protection for sensitive and ecologically important areas, the presence of polluting hot spots, etc. a significant number of problems arise in relation to the basin's sustainability and resilience. Again, the river basin is considered here as a logical environmental unit, where the river is the focus of the ecological catchment processes (Davies & Walker, 1986) and all bio-geo-physical properties show for a pattern of integrity within the basin, based on the dependency linkages between different ecosystems.

All problems and risks in Shkumbini river basin originate from lack of concern on the fragile equilibrium of ecosystems and poor management and lack of protection for natural resources. The expansion of urbanisation has led to agriculture and forestland conversion into urban, therefore increasing the soil sealing and deforestation. This, together with poor management of water resources and forests have caused widespread erosion phenomena all over the basin and floods in the valleys, loss of biodiversity, and increased levels of pollution in air, soil and water. The following provides a more in-depth overview of the major watershed degradation factors in Shkumbini river basin.

1. Erosion and sedimentation causes include both, natural and human made factors. The mountainous character, the accentuated slopes, the erodible flysch formations and the high amount of rain in concentrated periods lead to a continuous development of the erosion in various parts of the basin. Furthermore, the river is geologically new (as all Albania's rivers area) and hence with a steady bed consolidation process

(Xhemalaj *et al*., 2000). On the other hand, human activities such as deforestation and substitution of most riparian areas with agricultural plots, together with poor forest management practices, have added up to the natural factors and augmented erosion in intensity and extension. Erosion is visible in the slopes as well as in the river's sedimentation process. The amount of alluviums is higher in the lower basin, in the low-to-hilly areas. The sediment changes from $1{,}840.10^3$ ton/year in the upper parts to $7{,}750.10^3$ ton/year in the flat area (Xhemalaj *et al*., 2000). Most of the sedimentary material is present in the wet season, counting for 10 times more compared to the dry season (Xhemalaj *et al*., 2000).

2. Forest fires constitute a serious problem on both, an ecosystem and watershed level. During 2007 only, 8% of the forest area in Albania was burnt (REC, 2015). From a quantitative perspective, this area is very close to the total of Shkumbini basin forests. One of the factors that contribute to intentional forest fires is overgrazing. As in many other Mediterranean countries, grazing is a common activity that takes place in the Albanian forests. The number of goats and sheep per hectare of forestland was about 2.85 heads per hectare in early 2000s[26], quite high compared to the Mediterranean average, indicating a serious risk for erosion and land degradation (Muharremaj *et al*., 2002). Property conflict is another substantial cause of forest fires. This statement is rarely found in official reports, because being a hidden activity and officially unspoken. However, in the interviews and focus groups held with the municipal officials and forest users, it was affirmed that fires were a common mean used by ownership claimants to oblige one-another for repositioning. According to official national reports, from 2000 to 2009, forest fires have declined and the contribution of land use change and forestry in the total greenhouse gas emissions has also fallen significantly, to have a negative value in 2009 (AKM, 2014); (Demiraj Bruci *et al*., 2016). Nevertheless, no further monitoring and assessments have taken place since, so it is not possible to provide current evidences. Still, interviewees declare that more forest fires have occurred during 2017, compared to previous years and climate conditions (lack of precipitation and constantly high temperatures not dropping below 35^oC for more than 3 days in a raw (Bionews, 2017)) have certainly played a role in encouraging combustion and spreading the flames in large territories.

3. The quality of the water in the river is heavily compromised due to agricultural and urban activities that discharge chemicals and untreated waste in Shkumbin and in

its tributaries. Deforestation and depletion of the river's riparian areas exacerbate further the effect caused by the significant amounts of pollution discharged in the river and in the aquifer. The quality of surface waters is monitored annually by The National Environmental Agency (NEA). In general, NEA has usually classified the basin of Shkumbin as of the 3rd-4th quality level, in a system of 5 levels, with the 1st being excellent and the 5th vey poor (bad in the classification provided in annex 6). Hence, Shkumbin monitoring values represent a moderate to poor level of water quality. However, in order to have a neutral opinion on the quality of Shkumbini river waters and be also able to relate this to the land uses and land cover change in the basin an independent water monitoring process was undertaken[27]. The data were also compared to the NEA values[28]. In overall the results[29] of the monitoring show the following:

- The water along the main stream channel of Shkumbin is alkaline (pH >7)[30] as revealed by all samples and equal to NEA findings for different monitoring years. BOD_5[31] values stand within the norm[32] (see annex 6) in all samples and compared to NEA are much lower[33]. Environmental monitoring report 2015 provides values as high as 5.7 – 7.7 mg/l for BOD_5, while in the case of the independent monitoring BOD_5 is not higher than 1.28 mgO_2/l. It is hard to explain this controversy in figures, keeping in mind that in both monitoring cases, the dissolved Oxygen is also high. Furthermore, as annex 6 provides, all other parameters are easily comparable among them for both monitoring sources and the difference stands only for BOD_5.

  In general, as the different settlements of the basin in the middle to lower part, especially those located close to the river, discharge their untreated wastewater into the river, it is expected that BOD_5 should also be high. The low values may be partially explained through two facts: the amount of water in the river (the discharge) was high during the monitoring period[34], and the high presence of heavy metals plays a role in slowing down or suppressing the activity of microorganisms (Mittal & Goel, 2010) (Mittal & Ratra, 2000); (Bodine & Janzen, 1976). As a matter of fact, heavy metals such as lead (Pb), cadmium (Cd), nickel (Ni), iron (Fe), copper (Cu), and chromium (Cr)[35] have values that stand significantly above the standard limits. On the other hand, the values of manganese, zinc, cobalt, mercury, and arsenic stand within the

allowed levels. The presence of heavy metals in the water is related to the leaking of industrial waste from large heavy industries (classified as environmental hot spots and brown fields) located along the river in the area of Elbasan. Still, more research is needed to explain the relation between the values of the different parameters, knowing also that some of the metals may increase rather than decrease BOD. The monitoring of all parameters should take place annually and more parameters should be measured for a complete understanding. So far, NEA is not monitoring heavy metals, and therefore it is impossible in this research to compare the own generated data with an official multi-annual monitoring database.

- While $N\text{-}NH_4$ is higher than the standard level only for one of the 11 samples (the endpoint of the vast agricultural field of Elbasan), nitrates ($N\text{-}NO_3$) and nitrites ($N\text{-}NO_2$) stand well above the allowed limits[36]. NEA is actually reporting lower values for 2015. Furthermore, the standard limit used by NEA is higher than those used by different EU countries and the EU directive. As a result, it depends on the standard limit whether monitored values are to be considered good or poor. Nitrogen and its compounds are being used as fertilisers in agriculture and often wash as excess nutrients in the river or leach into the aquifer in rainy periods. Significant sources of these nutrients are also the septic tanks used so commonly in the rural area to discard household wastewater.
- Coliform bacteria are also at high levels, always above 300 Cfu/100ml[37].
- In overall based on NEA 2015 monitoring data, the river Shkumbin and the waters of the basin are classified as of 3rd or moderate category of quality, in a classification of five levels[38].

4. Hydropower plants (HPP) being constructed in Shkumbin and its tributaries constitute a high risk factor for the health and stability of the basin in overall. According to riverwatch.eu[39], there are at least 7 existing HPPs, another 7 under construction and over 56 planned to be constructed (River Watch, 2014). These HPPs have various capacities from 1MW to 50MW (River Watch, 2014). Some of the small HPPs are planned to be constructed in the headwater streams, including the river source tributaries in the Shebenik national park and in Valamare. The HPPs will

impact the forest area and its biodiversity, as well as increase further the erosion in the basin and along the river.

5. Floods are present in the basin, mostly in its lower area, namely in the urban system of Elbasan-Cërrik, in the stream segment in front of Peqin and in the flat agriculture land, just before the delta in the Adriatic sea. The floods are an immediate result of the erosion, due to both natural and human factors. Deforestation in the upper areas of the basin, where erosion originates, contributes to sediment transport and siltation in lower areas (Muharremaj *et al*., 2002). By converting riparian areas into agriculture land, the inhabitants have eliminated an important bio-filtering mechanism and compromised the soil stability. This is further exacerbated by the insert extraction and gravel mining activities for the construction industry in the riverbanks, which has led to a change of the riverbed in the affected segments (Xhemalaj *et al*., 2000); (Muharremaj *et al*., 2002).

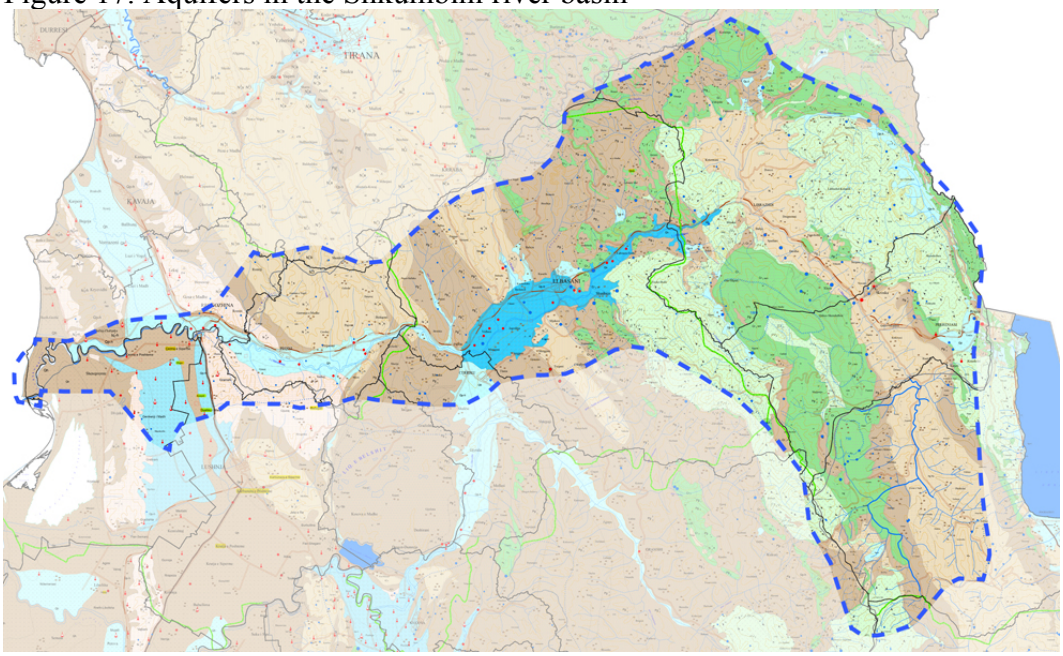
6. Both major types of aquifers in the basin – porous gravel-integranular and karst are at high risk due to human activity. The porous gravel-intergranular aquifers are found in the lower parts of the basin and in the valley of Elbasan (SHGJSH, 2014a). The latter is the major aquifer of this type in the basin and is unconfined, meaning its upper surface is covered by highly permeable material (AKM, 2016). The aquifer itself has high water permeability (SHGJSH, 2014a) and is the main drinking water source for more than 150,000 inhabitants living in the city of Elbasan and in the surrounding valley. Ironically, the whole urban area, including the industrial (brownfield) sites, is located above the aquifer. Informal settlements have also developed in the last 27 years, therefore leading to uncontrolled drilling for water wells and several septic tanks that discharge in the underground (Bashkia Elbasan, 2016). Increasing water withdrawal from both, the main stream and the aquifer and lack of protection of the aquifer from the effect of urban developments above the surface contribute to inadequate drinking water supply, both in quantity and quality terms (Muharremaj et al., 2002). Quantity problems are felt mainly during low discharge months, while quality remains an all-year problem.

Along the valley, downstream in Peqin and in the south of Kavajë (in the flat area, close to the sea) there are two other intergranular porous aquifer but with medium to low permeability (SHGJSH, 2014b); (SHGJSH, 2014c). In both cases, lower permeability is a factor of protection, however on the other hand, both sections are

located under the agricultural terrain and get polluted from the discharge of the nutrients used in crop cultivation. The northern part of the aquifer of Lushnja is also partially contributing to the Shkumbini basin. This porous aquifer has high permeability, but rocks of moderate imperviousness and clay cover the water table, therefore protecting it from the pollution generate by the agriculture land and the urban settlement in Lushnja (SHGJSH, 2014c); (AKM, 2016).

In contrast to the middle-to-low basin, the middle-to-upper basin is distinguished for its karst type aquifers – combination of intergranular pores in the rock, fissures and voids (SHGJSH, 2014a). Most of the basin's forests are over the karst areas in the basins "contributing zones" (Marsh, 2010). This is positive, as the karst has no direct link to the urban developments. Furthermore, the forests provide valuable services to water purification, therefore dealing with karst's main vulnerability – pollutants and contamination that easily penetrate the karst via sinks and quickly spread due to immediate contact with the water flow and lack of filtration or poor retardation processes. Still, the wide spread deforestation of the last two decades constitutes a serious risk and may have disrupted the natural balance of the affected ecosystems.

Figure 17. Aquifers in the Shkumbini river basin



Source: Albanian Geological Service, 2014 and own graphical elaboration

7. Environmental industrial hotspots are present in the basin in the opening of the Shkumbin valley in Elbasan, in the "collection zone" (Marsh, 2010) of tributaries and in the "conveyance zone" (Marsh, 2010) of the main stream-channel. Their location does not disturb the upper basin's ecosystems and forests, but it affects the river, the

aquifer and the urban settlements in a direct way. The Metallurgical Complex is the major industrial hotspot of Elbasan, with ferrochromium, steel and nickel smelting activities, installed as of 1976. This complex was the largest plant in the country with a treatment capacity of 800,000 tons/year of ferronickel and an estimated production of around 45 ton of toxic dust per year (Tota *et al*., 2010). To date, most of the activities are shut down, but a volume of 400,000m3 of hazardous industrial waste is present in the premises of the complex and the soil in and around the complex is polluted with heavy metals, mostly chromium, iron, manganese, cadmium, zinc and copper (Peck & Zinke, 2006); (UNECE, 2012); (Mankolli *et al*., 2009). The values of chromium and nickel in agriculture land are found to be 4 times higher and more than the threshold for contaminated soils (Hoxha *et al*., 2015), due to 1.5-2 million tons of ferronickel slags and ferrochromium wastes dumped and buried in the soil (Peck & Zinke, 2006), while the polluted water (as reported above) is used for irrigation in agriculture. Tota *et al*. (2010) conclude that the pollution of soil and water is very high in a radius of 2-5 km from the industrial site and it is present in lower values up to 20 km from the site.

In conclusion, while deforestation and erosion problems are more prominent in the upper basin (contributing zone), the pollution and erosion effects are concentrated in the conveying zone with some risk areas and floods in the collection zone. The contributing zone appears to be clean at the moment, but deforestation and erosion, if not reverted, will move pollution factors in the upper basin as well. On the other hand, the services of the upper basin to the lower basin have decreased due to the reduction of the forest area. The lower area is polluted in air, water and soil. There are point and non-point pollution sources, with unplanned urbanization, industrial hotspots, agriculture activities and valley deforestation being the major factors of pollution, health injuries and ecological balance disruption. The people who live in Elbasan and around the Elbasan valley are at the highest risk of exposure. Here, air and soil pollution seem to be of higher concern than riverbanks and sediments pollution (Shtiza *et al*., 2009); (Mazreku *et al*., 2011). Lack of protective vegetation in the valley and in the riparian areas exacerbate further the exposure levels.

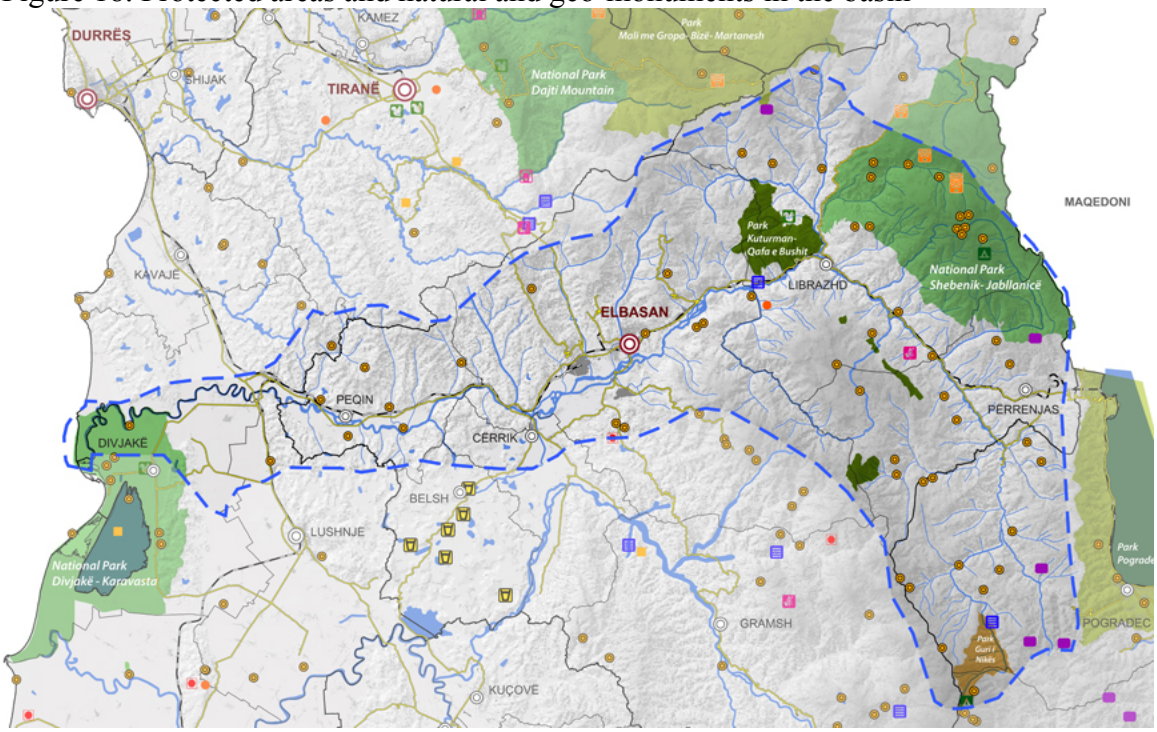
4.2.2 The [governance of] forests in the Shkumbini river basin

Out of 1,041,000 ha or 33% of the total territory (AKM, 2016)[40], Shkumbini basin has

97,000 ha of forests (Corine 2012) or around 9% of the total forest area in Albania. Some of the most important and particular species include oak, beech, pines and firs. Oak forests are the most common ones, located on the middle basin and in the conveying zones, sometimes mixed with ashes (*Fraxinus*) and maple (*Acer*). Oak is found above the Mediterranean evergreen shrubs (such as *Juniperus, Buxus* etc. commonly found within the basin), up to altitudes of 1,000m above sea level. Most of the commonly managed forests are oak and this is related to their expansion as well as location – very close to the villages. People in the basin use oak mainly for household needs on firewood and to a lesser degree in the construction process[41].

Beech (*Fagus sylvatica*) is present in the areas of the upper basin close to the Shkumbin sources and headwater streams. The Rrajca beech forest is part of the Ancient and Primeval Beech Forests of the Carpathians and other Regions of Europe. It covers a territory of 2,129.45 ha and has a buffer area of 2,569.75 ha (UNESCO, 2016); (ECO EAA, 2016). Besides having excellent firewood qualities and being used as construction material and for furniture, the beech forest offers a special biodiversity-rich ecosystem dominated by the virgin forests of *Fagus sylvatica* – the Rrajca[42] forest is already a protected national park (AKZM, 2008). This park is also an important biocorridor of large mammals protected by international conventions (AKZM, 2008). The residents of the village near the park take fodder and wood material in the park in coordination among them. Being a protected area, legally it is not allowed for the village residents to withdraw forest material. The villagers are aware of this fact and take care that no one misuses the forest. In the warmer areas there are also Pines and birch (AKM, 2016); (AKZM, 2008).

Figure 18. Protected areas and natural and geo-monuments in the basin



Source: AKZM; (SHGJSH, 2014a) (SHGJSH, 2014c) (SHGJSH, 2014b); own graphical elaboration

LEGEND

GEO-MONUMENTS

- Burimime termale minerale
- Erozionale lumore
- Erozionale nga agjentet atmosferike
- Gjeomorfologjike akullnajore
- Gjeomorfologjike karstike
- Gjeomorfologjike komplekse
- Historike
- Metalogjenike-Ekonomike
- Neotektonike
- Paleoambientale
- Paleobotanike
- Parqe natyrore
- Rezervate gjuetie
- Stratigrafike
- Tektonike-strukturore
- Liqenet dhe depresionet karsitke

PROTECTED AREAS

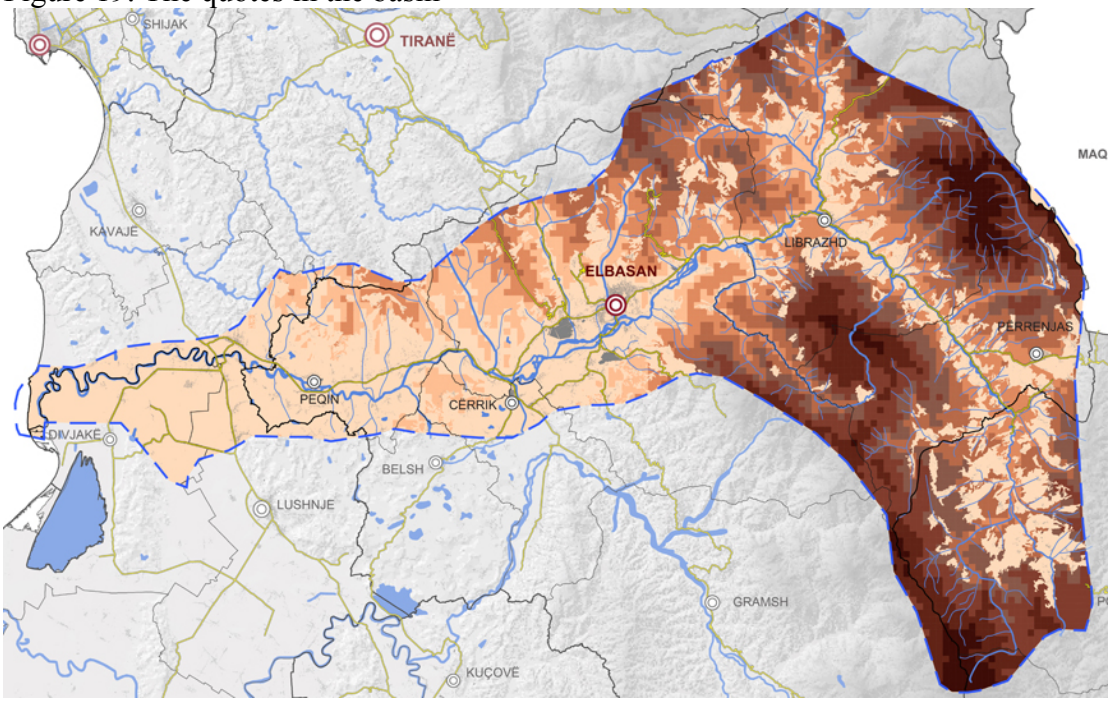
- Second Category: National Park
- Fourth Category: Managed Nature Reserve
- Fifth Category: Protected Landscape
- Sixth Category: Resource Protection

OTHER

- Border of Shkumbin Basin
- Rivers
- Lakes
- Urban areas
- Main Streets
- Railway
- Main Cities
- Secondary Cities
- Border of Qark
- Border of Municipalities

The Bosnian pine (*Pinus heldreichii* or rrobulli in Albanian) is present in altitudes of 1,400-2,000m above the sea level, on rocky areas (in the karst aquifers), mainly in Shebenik and Valamare[43] (AKM, 2016). Finally, the European silver fir (*Abies alba*) is found in the upper parts of the middle basin, both in the north and south, such as Qarrishtë in Librazhd, Shebenik and Lukovë, in Gramsh (AKM, 2016).

Figure 19. The quotes in the basin



Source: https://geoportal.asig.gov.al and own graphical elaboration

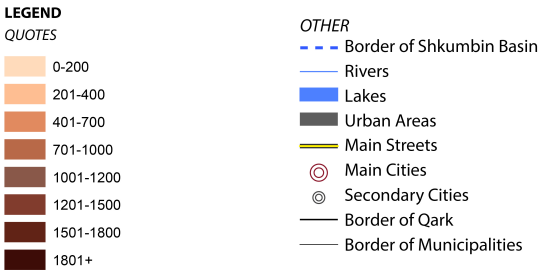
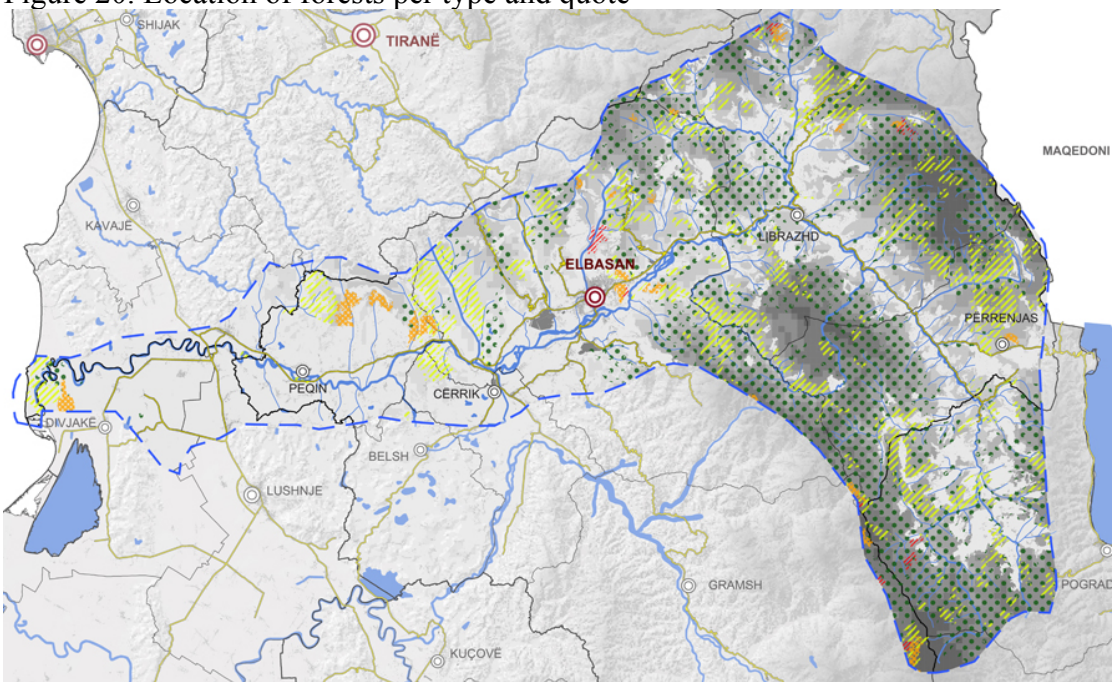
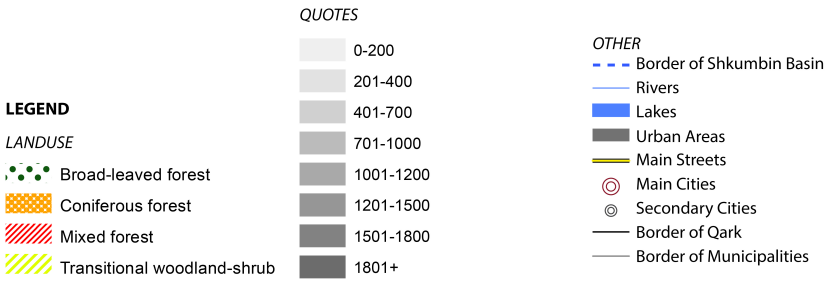


Figure 20. Location of forests per type and quote

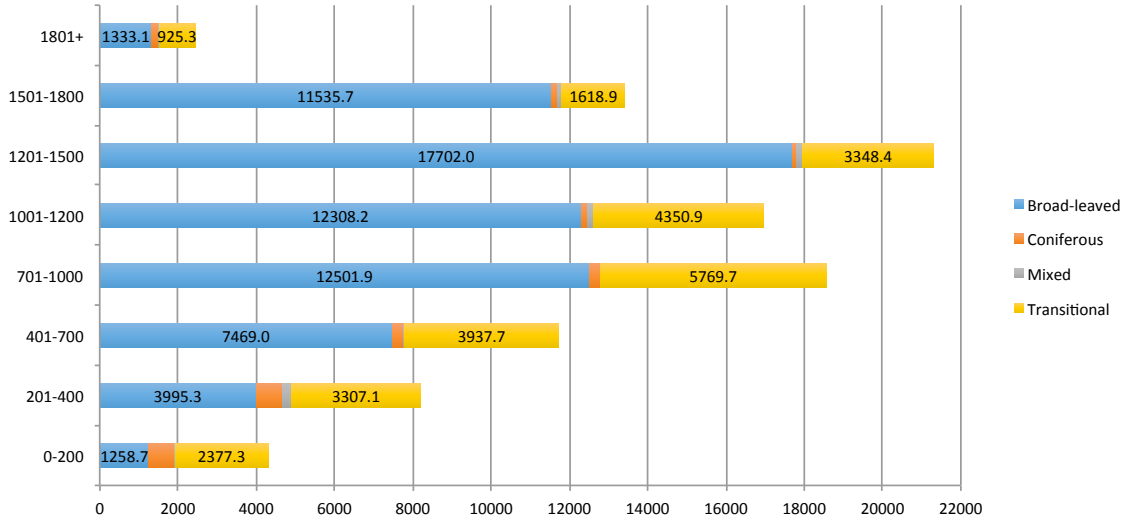


Source: Corine 2012, https://geoportal.asig.gov.al, and own graphical elaboration



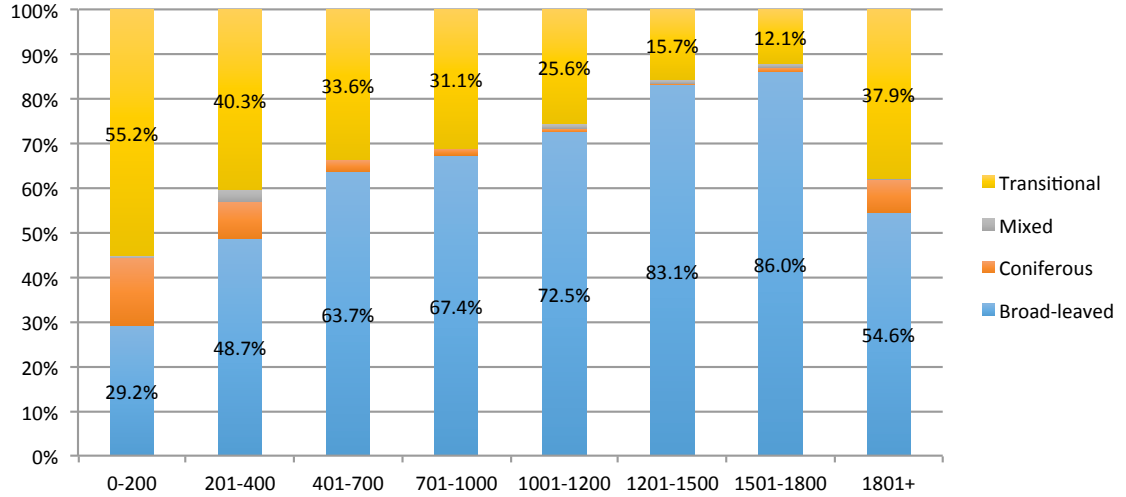
The broad-leaved forests are dominant in the basin and as described above for different species, they are found in all altitudes – mostly on 1,200-1,500m above sea level.

Figure 21. Distribution of forest area per type and quote (totals in ha)



Source: Corine 2012, https://geoportal.asig.gov.al, and own data processing

Figure 22. Distribution of forest area per type and quote (as % to the total per quote)

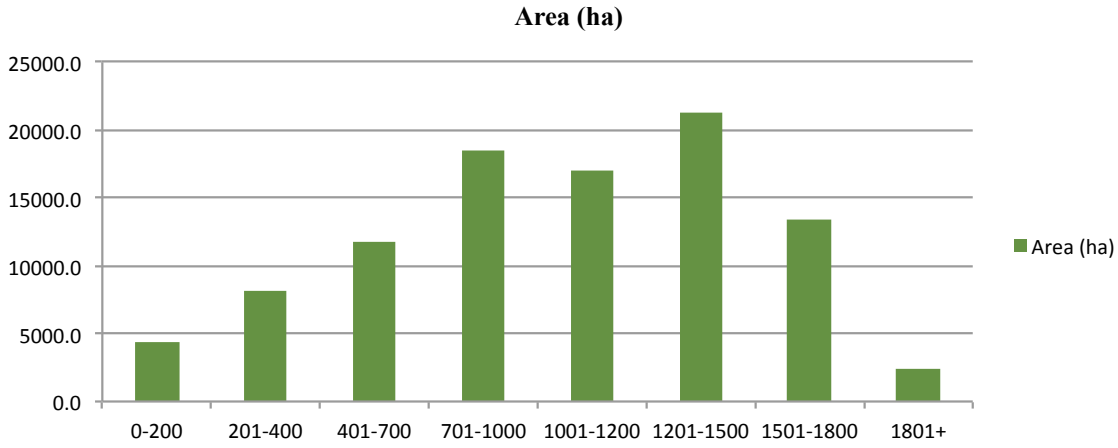


Source: Corine 2012, https://geoportal.asig.gov.al, and own data processing

As a matter of fact most of the forest area is present in the altitudes 700-1,000m above sea level and 1,200-1,500m above sea level. These ranges include oak and beech. As

the above graph shows, the higher in the basin the more the broad-leaved forests are present. However, after the altitude of 1,800m above sea level transitional shrub and forests take advantage leading towards pastures. Most of the common forest management happens in the altitudes 700 -1,200m above sea level where the oak forests are present[44].

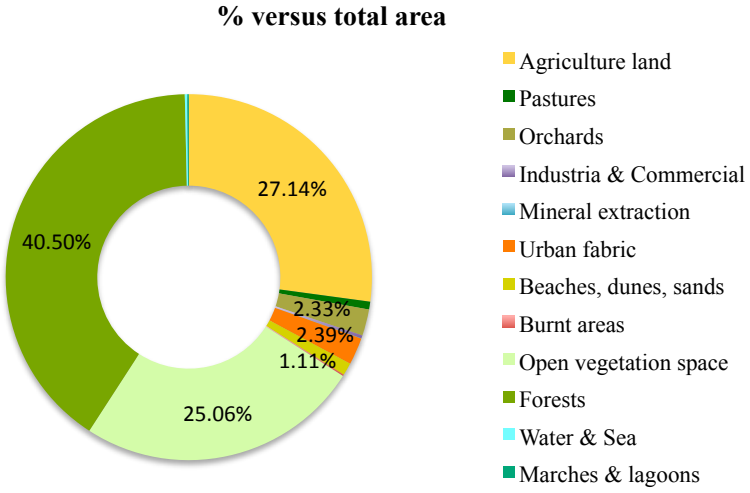
Figure 23. Distribution of the total forest area per quote ranges



Source: Source: Corine 2012, https://geoportal.asig.gov.al, and own data processing

In terms of the land cover and land use, the following graph based on Corine 2012 database shows that forests constitute the major type of land use in the basin, with around 41% of the territory. Agriculture and open vegetation space are ranked lower with 27% and 25% respectively. Most of the forests are located in the upper parts of the basin – in the contributing zones, together with pastures and open vegetation space.

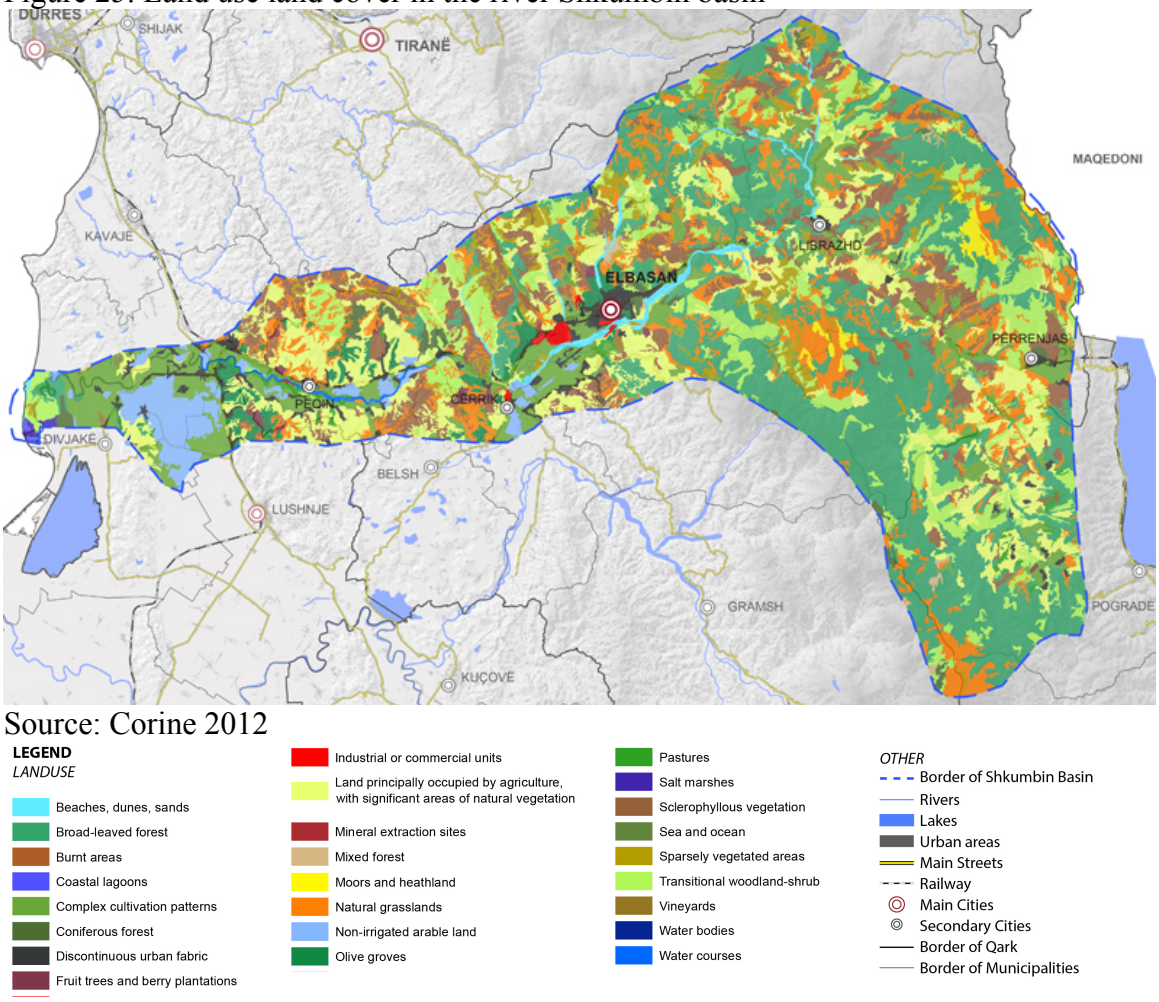
Figure 24. Major land use in the basin according Corine 2012



Source: Corine 2012; merge of the author based on level 3 labels

Agriculture and the urban fabric (2.4% of the basin's territory) are located in the lower areas, mainly over the important aquifers and close to the main stream-channel. Orchards are also an important portion of the land use types with 2.33%, comparable to the urban fabric, though significantly lower compared to forests and crop land.

Figure 25. Land use land cover in the river Shkumbin basin



Source: Corine 2012

Territory wise, forest management is a key public function. Since two years, with the review of the governance decentralization system, forest management has become an exclusive function of local governments. Prior to the reform forests were a shared function between national and local governments. The latter were responsible for the so-called communal forests, while the previous for the environmentally protected areas and massive forests in the upper basins' areas. Figures from the forest property transfer process (from national to local governments) in 2007 show that the municipalities of the Shkumbini basin were responsible of around 30%[45] of the forests' area that municipalities should manage in 2017 and that it is approximately 97,000ha[46].

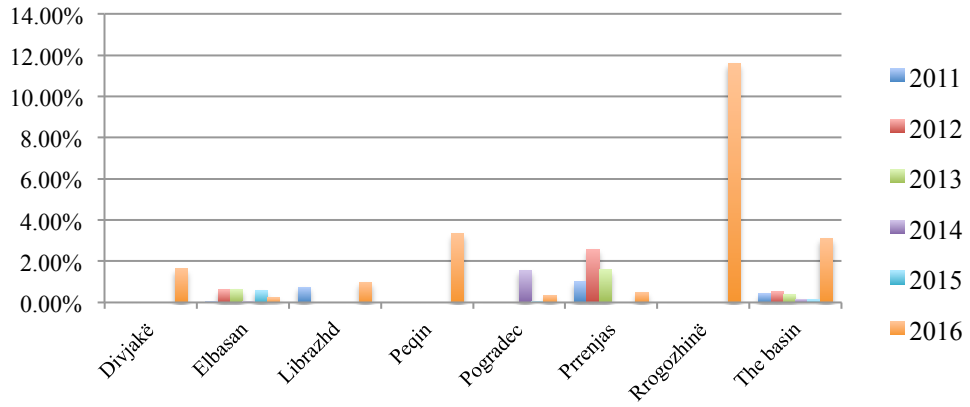
When asked about the usefulness of this decision, local governments reported mixed opinions. Some of them consider the decentralization of forest governance as appropriate and necessary because, based on principles of proximity, accountability, participation, efficiency and subsidiarity, the sense of local governments' responsibility versus forests' protection is higher. In order to be accountable towards their constituencies, local governments will have the inclination to cooperate with people in bringing forward a well-functioning polycentric system of sustainable forest governance. National government institutions, on the other hand, regardless of their political agendas and interests, do not have a connection with local resources and local forest users. By being detached, national government officials make rational and/or power choices, which do not necessarily reflect the local conditions and needs. Hence, a centralised approach does not support sustainable forest development. On the contrary, it leads towards personalised actions of a self-contained group of few individuals, who holds the power (Gryzmala-Busse & Luong, 2002) of decision-making and applies limited criteria of mere profitability to forest use.

The other group of local officials support centralization under the pretext of absence of human and financial resources at local level. In fact, soon after the devolution of the forest management function, the municipalities were faced with two major challenges: **1)** the number of municipal employees dedicated to forest management was reduced by 3 or 4 times compared to the levels before the reform, when forest management was a shared function between municipalities and district directorates. For instance, the municipality of Elbasan (the biggest one in Shkumbini basin) has only 7 forests engineers instead of 20 that the district directorate had for managing the same area. The forests and pastures area is around 53,000. Similarly, the municipality of Librazhd has 7 engineers instead of 15. Furthermore, the municipality of Pogradec administers around 28,600 ha of forests and has a forest department of only 4 employees. The municipal forest staff gets support from the local units administrators[47], who among other responsibilities, carry out also forest monitoring.

2) the financial resources to support forest management are very low and the responsible municipal departments do not have the necessary machineries and instruments to use during field work. Looking at financial resources (the following graphs), there has been clearly an overall increase in the amount of funds dedicated locally to forestry, agriculture and fishing. However, there are two hidden aspects to

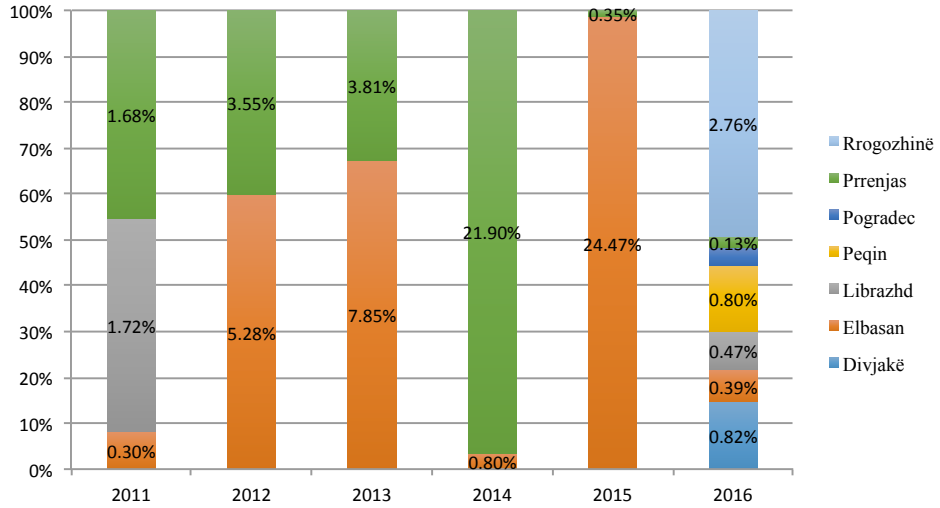
consider: first, the total amount has increased as a result of the salaries' fund transferred to municipalities. From a situation of none to some local forest managers, the total fund has positively changed. However, the total amount was transferred from 36 districts to 12 qarks and then to 61 municipalities, therefore resulting in a reduced portion per municipality and subsequently less staff than at district level; second, the following figures are a composite of both, forests and agriculture, with the latter including funds for drainage and irrigation systems, transferred to local governments after the decentralization reform of 2016. As a result, it is hard to understand what is the exact amount dedicated to forests management only.

Figure 26. Expenditures on forestry, agriculture and fishing versus total annual expenditures for each municipality



Source: www.financatvendore.al (2017) and own calculations, based on Ministry of Finance data

Figure 27. Municipal expenditures versus basin's expenditures for forestry, agriculture and fishing



Source: www.financatvendore.al (2017) and own calculations, based on Ministry of Finance data

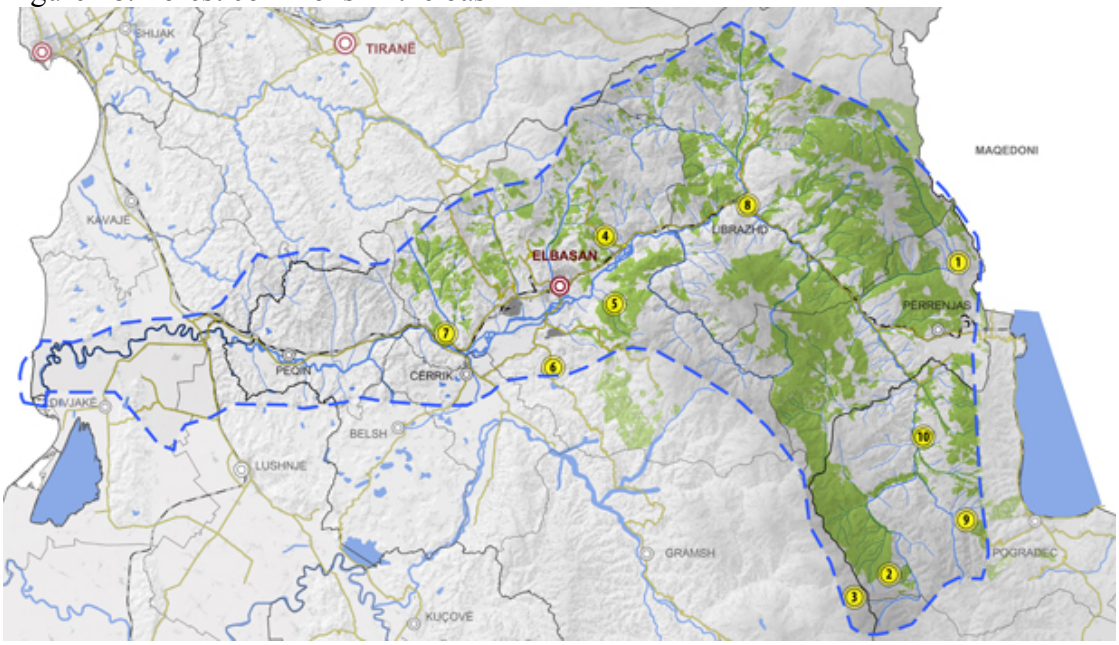
In these circumstances, it may sound at first logical to wish for a recentralization. However, this reveals in one side a hidden mentality inherited from the past, where under the communist state, people were used to delegating thinking and responsibility (Shutina & Toto, 2010), and acting as mere implementers within a wider frame defined and maintained by the system. In the other hand, it also shows that financial decentralization is incomplete and this devolution was used by the national government to release certain challenging tasks, while still saving the space for exercising power in policy and financial decision-making. Municipal officials are aware of receiving a new task, which brings management challenges along, but so far they have not received also a financial bill to fund activities for which they are now responsible.

Without the necessary financial means and with reduced staff capacities, local forestry departments are not able to draw forest management plans. The latter are legally required to guide forest management, including license rights and commons' systems. The current plans are out-dated beyond their 10 years of legal validity period and the local officials feel powerless to undertake new plans, due to missing budgetary sources. In these circumstances, both decentralisation enthusiasts and centralization advocates are currently striving to achieve access to funds to advance forest protection and sustainable management.

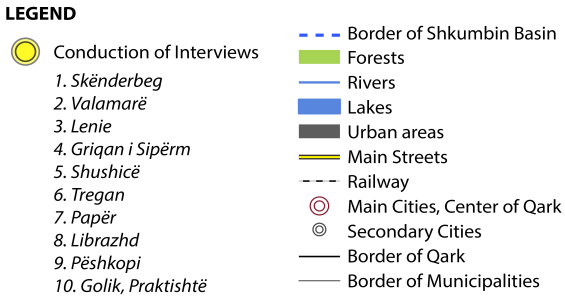
Around 30% of the forest area in the basin is managed as common pool[48]. These forests are situated close to the villages (proximity criterion) and the villagers had users' rights on the forest resources before 1945 (the historical criterion). After 1990, with the demise of the socialist and centralised economy regime, "a conscious desire to unmake socialist property" was evident throughout the country and many people "engaged in acts of forest destruction", aiming at eliminating the "possibility for the regime to recover control" over assets, properties and resources (Sikor *et al*., 2009, p.179). Hence, in the first 1-2 years, people committed often acts of vandalisms, contributing to the deforestation of several 'village forests'[49] as a conscious or unconscious mean for undoing property relations established during the past regime. However, soon after this collective heresy, the villagers gained memory of the period before land collectivization (before 1945) and cooperated (in most cases) to rebuild a customary system of property relations on forests (Sikor *et al*., 2009), leading again to a forest commons' system.

However, this was not always the case. Sikor *et al.* (2009) and the interviews held with stakeholders in the Shkumbini basin show that there were also cases, where the villagers could not re-establish a system of common forest governance. This happened for a number of reasons: i) the community bond was either weak or non-existent for people to initiate cooperation – mainly in those cases where the villagers were not 'autochthonous' to the settlement; ii) the forest legislation was not favouring the establishment of forest commons' institutions – the policy and legislation framework was/is not supportive to commons and neither was/is against commons. As a result the success or the failure of commons was/is depended on the social network behaviour – thus the relationships established among the villagers and between them and the forest officials; and iii) the attitude of the forest officials towards the role of the villagers in forest governance – the openness and readiness of forest officials to understand and accept the role of the commoners in achieving sustainable forest management has been key in the last 25 years to the success of forest governance. All cases analysed by this research are developed on the basis of such understanding and mutual cooperation between villagers (forest users) and local/forest officials Much of this discussion is already made in the section 4.1 and will follow in more details in section 4.3.

Figure 28. Forest commons in the basin



Source: interviews and focus groups



4.2.3 Forests as ecosystems within the integrated watershed management approach

Being part of the Mediterranean forest ecosystems, Albanian forests embody the same conditions and types of vulnerabilities. Furthermore, belonging to the southern part of the region, these forests are characterised by a long history of human pressures, such as overexploitation for fuelwood, clearing and fires for agriculture and overgrazing, fragmentation and land cover conversion due to urbanization and tourism, overharvesting of non-timber products with unsustainable techniques, and lack of maintenance activities, all leading to forest degradation and an unsettled history of forests property rights (Palahi *et al*., 2008).

The Mediterranean forests constitute a unique type of forest ecosystems. "The Mediterranean has the second highest number (13,000) of endemic plant species in the world after the tropical Andes with its 20,000 plant species" (Merlo & Paiero, 2005, p.12). While the total area of Mediterranean forests is lower compared to tropical and other forests, "they have specific features, which make them a unique world natural heritage" (Palahi *et al*., 2008, p.677). Their small size may be one of the reasons why at the international level Mediterranean forests have not gain as much attention (with the exception of FAO programs) as the other types of forests. On the other hand, being very rich in terms of biodiversity, being located in a transitory climate change area, and offering a large number of regulatory services, especially soil protection and runoff control – hence recognised for their protective role as against the production role (Merlo & Paiero, 2005), they have a high value not simply at regional, but at global scale.

These forests require special attention because: they constitute a unique nature world heritage, highly rich in biodiversity; they provide critical value to the wellbeing and livelihoods of the people living in the region; their conditions affect the availability of water in the region; in the southern part of the Mediterranean, they are vulnerable to a various factors such as desertification, fires, urbanization, over-exploitation and over-

grazing, and especially climate change, while in the northern part abandonment due to urbanization and market shifts is their key vulnerability (Palahi *et al.*, 2008); (Merlo & Paiero, 2005). The latter is a major factor of concern because if these forests are not protected, climate change scenarios will further increase their vulnerability to the other factors and altogether lead to extreme floods and draughts over the entire region. In these circumstances, the risky conditions of the Mediterranean countries and of their forests will expand to the neighbouring areas, therefore expanding as well all socio-ecological problems related to forests sustainability.

In these conditions, it is important to govern forests through integrated approaches on a national and regional scale. The regional level can be analysed within the countries and for the Mediterranean region as a whole. On a national level, the river basin constitutes an appropriate scale of research, planning, management and policymaking by considering all of the factors that impact the health of the basin as an ecosystem and the sustainability of forests as the key protective ecosystem to the watershed. However, as it was explained in the theoretical chapter, assessing the watershed protection function of forests is very difficult because of the overlapping boundaries at different scales. The impacts of watershed protection are felt away (distance and time) from the service providing areas/forest and downstream impacts are the cumulative result of all upstream impacts (Merlo & Croitoru, 2005b). Furthermore, the demand for the forest services, whether direct or indirect, is hard to be measured in a context of complex social-ecological relations. Hence, a thorough study of the social-economic context should take place next to the identification, mapping and assessment of the demand for forest services.

According to Palahi *et al*. (2008), "Merlo and Croitoru (2005) reported that approximately 40% of the total economic value (TEV) of Italian Mediterranean forests can be ascribed to watershed protection" and only around 35% of TEV can be ascribed to wood forest products. These protection services include protection of "agricultural soils, water conservation and purification" (Merlo & Paiero, 2005, p.11), and protection of other lands and settlements from geological and natural hazards, such as floods, erosion and land slides. Of course, there is also a high international appreciation for tourism, aesthetic and non-timber products and services, which if well managed contribute significantly to the local and national economic development.

In the Shkumbini river basin, forests are managed through a combination of national

and local policies and actions and a weak system of forest commons. The choice of instruments in use depends to a large extent on the overall governance system in place or the regime in power, as already explained in section 4.1. So far, most of the forest management happens at micro-watershed level and through fragmented measures (i.e. afforestation and improvements) implemented in isolation and with commons' institutions that do not cooperate among them as part of a management plan for the entire municipality or the river basin (Muharremaj *et al.*, 2002).

The conflicting interests, unsettled legal and property systems, and short-term interests of few groups of beneficiaries led to limited users' rights, control of forest resources from powerful individuals that own license rights or exploit informally, and weak forest commons institutions. Therefore, while the Albanian forestry policies largely recognise the role of forest ecosystems for the society, people and institutions strive to achieve a balanced and sustainable use of forests (Lazdinis *et al*., 2009, p.309), that has to succeed under the effect of many social-economic pressures.

The basin's region is composed of 8 municipalities (Pogradec, Prrenjas, Librazhd Elbasan, Gramsh, Peqin, Rrogozhinë, Divjakë), falling under 3 qarks (Elbasan, Korçë and Fier), with Elbasan constituting most of the basin's territory. The basin has a population of around 350,000 inhabitants, with a dominance of females versus males (INSTAT, 2016). For 2015, the area of Elbasan had an internal net migration rate of -1 per 1000 inhabitants[50], while Korçë and Fier have -4.7 and -4 respectively (INSTAT, 2015). These figures show that in all three qarks the emigration flows are higher compared to immigration ones, but in the case of Elbasan there is more balance between the two flows, compared to the other two qarks. This is probably so, because of the proximity of Elbasan city to Tirana – it is in this period that the new highway Tiranë-Elbasan became quite effective, shortening the trip from 1.30 hours to 30 minutes. However, the situation of population movement appears different in 2016, with Elbasan having a net migration rate of -3, while Korçë and Fier with -6 nd -2.3 respectively (INSTAT, 2016). This mostly linked to employment opportunities and access to services – in 2016, this rate has increased at least twice for both Tirana and Durrës showing for a tendency of people to reside in the Tirana-Durrës region (INSTAT, 2016).

From an economic development perspective, Fier had the highest GDP share (13.2%) in the Albania's total, with the exception of Tirana (37.6%) – an outlier, while

Elbasan and Korçë had 7.5% and 5.8% respectively. As it will be noticed later, Elbasan and Fier have a good combination of agriculture, forestry and industry compared to other qarks, therefore having higher opportunities of employment and GVA values. Due to population dynamics, Fier has also a GDP per capita that stands at 119,9% of the Albania's average, while Elbasan and Korçë stand around 25% below the national average (INSTAT, 2016); (Shutina et al., 2016). GVA per sector per qark shows that the Elbasan, Fier and Korçë are the only ones among the 12 qarks, to have a 'forestry and agriculture and fishing' GVA share higher than 10%. Among the three, Fier's GVA constitutes 19.6% of the sector, due to the large contribution provided by agriculture alone, as a result of the vast fields and fertile land (the lower part of the basin) (INSTAT, 2016). Elbasan and Korçë have shares of 13.2% and 10.2% respectively (INSTAT, 2015) (INSTAT, 2016). In the case of Elbasan, the forestry sector plays also a major role, with large and often intact (in the upper mountainous areas) forests and this is also reflected in the land use figures and GVA shares among sectors within this qark – 39.7%, while commerce (ranked 2nd) constitutes 14.6% (Shutina et al., 2016). The qark of Korçë has a similar structure, while in Fier agriculture/forestry/fishing and industry have shares of 33.5% and 32.3% each (INSTAT, 2016).

Poverty has not been measured in Albania after 2012, when the institute of statistics carried out for the third time a living standards measurement survey. Hence, the data are out-dated. In 2012, Elbasan and Korçë had a poverty headcount of 11.3% and 12.4% respectively, standing below Albania's headcount of 14.3%, while Fier had a value of 17.1%, being ranked 3rd among the 12 qarks for the highest poverty headcount (Shutina *et al.*, 2016). Almost the same balances are kept also for the poverty gap and severity (Shutina et al., 2016). High figures of Fier may be explained with it mainly rural structure of the population. In the case of Elbasan, most of the qarks population is located in the cities of Elbasan (more than 100,000 inhabitants), Librazhd and Peqin. In the case of Korça, lower poverty figures may be attributed to lower unemployment (self-employment in agriculture is common) and emigration in Greece (Shutina *et al*., 2016).

From a polycentric development perspective, the basin's region contains two urban cores (Elbasan and Pogradec), with Elbasan being classified also as an urban agglomeration. These constitute two out of the 18 functional urban areas of Albania[51]

(Toto et al., 2015). The polycentrism analysis shows that Albania is highly monocentric with GDP and population (morphological polycentrism) focused in the Tirana-Durrës metropolitan area. Albania has a morphological polycentrism index of 65.1 – the moderate figure is a variable of the size[52] and connectivity[53] indexes of 97 and 72.2 respectively and the location[54] index of 28 (Shutina & Toto, 2010); (Toto *et al.*, 2015). The latter reflects the legacy of the spatial distribution policy before 1990, aiming for uniformity across the territory and the establishment of urban settlements that could counteract Tirana and bring the working force closer to the resources (Toto *et al.*, 2015); (Shutina & Toto, 2010). Population migration dynamics (previously explained) and this past spatial policy provide good arguments in favour of the economic development, sectorial development and poverty distribution within the Shkumbini basin as described above.

The region has an average development level and considerable rural population that depends on agriculture, pastoralism and forestry. Besides historical reasons, by being located in the less accessible areas of the basin (the upper zone = the contributing zone), which are 30-45 minutes from the motorways and 45 minutes to 1.5 hours from the major urban centres (Elbasan, Librazhd and Pogradec) (Toto *et al*., 2015), the rural population has a strong bond with forests. As Barnes *et al.* defines, dealing with appropriation and provision dilemmas is an essential element of the sustainability of livelihoods for the rural mountainous communities of the basin.

Based on Burkhard and Müller (2015) p.79, the different land cover types – different landscapes, support the ecosystem and at the same time withdraw services from the ecosystem. This depends on the typology of ecosystem structures that each landscape has and therefore on the functions it performs to supply services "depending on the natural settings as well as on the human activities" in the respective area (Burkhard & Muller, 2015, p.77). As it has been already highlighted in the theoretical framework chapter, in order to include ES in policy decision-making and actions, it is necessary to understand the supply and demand relationship on quantitative and visual terms. A number of instruments are being developed and tested in this regard, but this research makes use of the 'matrix' that Burkhard and Müller (2005, 2009, 2012, 2015) have created to quantify and map through a simple system the budgets of ES supply and demand. The assessment matrix "links relative and mainly non-monetary ES supply capacities or ES demand intensities to different" (Burkhard & Muller, 2015, p.77)

land cover types (the territorial unit) and it makes the assessment by using scores of 1-5 and (-1) to (-5) to mean the supply and the demand respectively[55]. A score of 0 is equivalent to no relevant capacity to supply ES or no relevant human demand for ES, depending on whether the supply or demand matrix is filled in. Further details on the methodology, including the normalization of scores for both supply and demand can be found in (Burkhard & Muller, 2015).

The following figures no. 29 - 31 represent the matrixes of supply, demand and the budgets of supply-demand for the Shkumbini basin. The basin does not contain all of the 44 LULC types of Corine for which Burkhard and Müller have developed the matrix. Hence the following matrixes are reduced to only the 25-landcover types that available/present in the basin as referring to Corine 2012. The numbers used to denote the ecosystem services are the same as used by Burkhard and Müller (2015).

The application of this model on the Shkumbini basin needs to be completed further with specific ES data, to reflect flows and real/current use (demand for) of ecosystem services and real/current capacities (depending also on the quality of the ecosystem). However, an initial indication is provided through the following analysis, which is based on the mapping of ES Supply-Demand budgets score. The following analysis links the current use of land with the budgets, assuming that each ecosystem is in good conditions. On the other hand, a number of ecosystem-related and pollution problems were listed in the previous section, while an overview of the social and economic character of the basin's territory was provided earlier in this section. Any possible policy decision-making to address both, the environmental and the social-economic problems, would impact ecosystem services, in terms of capacities to address demand and in terms of pressures placed on them by the human demand. It is therefore important to understand, though yet without final and specific data, which is the relationship between ES and the social-economic factors in the basin. This is a guiding step to the discussion of SESMAD variables and Ostrom's design principles on forest commons in the next section.

Figure 29. Land cover types (Corine) in Shkumbini basin and their ES supply

Land cover types (Corine) and their supply capacity to Ecosystem functions and services (0 - no relevant capacity and 5 - maximum relevant capacity)	**Ecological Integrity**	Exergy capture	Entropy production	Storage capacity	Cycling and Nutrient loss reduction	Biotic waterflows	Metabolic efficiency	Heterogeneity	Biodiversity	**Regulating services**	Global climate regulation	Local climate regulation	Air quality regulation	Water flow regulation	Water purification	Nutrient regulation	Erosion regulation	Natural hazard regulation	Pollination*	Pest and disease control*	Regulation of waste*	**Provisioning services**	Crops	Biomass for energy	Fodder**	Livestock (domestic)	Fibre	Timber	Wood Fuel	Fish, seafood & edible algae	Aquaculture	Wild foods and resources	Biochemicals and Medicine	Freshwater	Mineral resources***	Abiotic energy sources***	**Cultural services**	Recreation and tourism	Landscape aesthetics & inspiration	Knowledge systems	Religious & spiritual experience	Cultural heritage & cultural diversity	Natural heritage & natural diversity
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**		**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**		**34**	**35**	**36**	**37**	**38**	**39**
Non-irrigated arable land		5	4	4	1	3	4	3	2		1	2	0	1	0	0	0	1	0	2	2		5	2	3	0	5	0	0	0	0	0	1	0	0	0		1	1	2	0	3	0
Complex cultivation patterns		4	3	3	1	3	2	4	3		1	2	0	1	0	0	0	1	0	3	2		4	1	3	0	4	0	0	0	0	0	2	0	0	0		2	2	2	0	3	0
Agriculture and natural vegetation		3	2	3	2	3	2	3	3		2	3	1	2	1	0	3	1	0	3	2		3	2	2	3	4	3	3	0	0	3	1	0	0	1		2	2	3	0	2	3
Pastures		5	5	4	2	4	5	2	2		1	1	0	1	0	0	4	1	0	2	4		0	1	5	5	0	0	0	0	0	0	0	0	0	0		3	2	2	0	3	0
Fruit trees and berry plantations		3	2	3	2	4	2	4	3		2	2	2	2	1	1	2	2	5	3	2		5	1	0	0	0	4	4	0	0	0	0	0	0	0		5	2	2	0	4	0
Olive groves		3	2	3	1	3	2	3	2		1	1	1	1	1	1	1	0	0	3	2		4	1	0	0	0	4	4	0	0	0	0	0	0	0		5	2	2	0	4	0
Vineyards		3	2	2	0	3	1	3	2		1	1	0	1	0	0	0	0	0	1	1		4	1	0	0	0	0	1	0	0	0	0	0	0	0		5	2	2	0	5	0
Industrial or commercial units		0	0	0	0	0	0	1	1		0	0	0	0	0	0	0	0	0	0	0		0	1	0	0	0	0	0	0	0	0	0	0	0	1		0	1	0	0	1	0
Mineral extraction sites		0	0	0	0	0	0	2	2		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	5	5		0	0	1	0	0	0
Discontinuous urban fabric		1	1	1	1	1	1	1	1		0	0	0	0	0	0	0	0	0	0	0		1	1	1	0	0	0	0	0	0	1	0	0	0	1		3	2	1	5	1	0
Broad-leaved forest		5	4	5	5	5	4	3	4		4	5	5	2	5	5	5	3	5	4	4		0	1	1	0	0	5	5	0	0	5	5	0	0	0		5	5	5	3	3	5
Coniferous forest		5	4	5	5	4	4	3	4		4	5	5	2	5	5	5	3	5	4	4		0	1	1	0	0	5	5	0	0	5	5	0	0	0		5	5	5	3	4	5
Mixed forest		5	4	5	5	5	4	3	5		4	5	5	2	5	5	5	3	5	5	5		0	1	1	0	0	5	5	0	0	5	5	0	0	0		5	5	5	3	4	5
Beaches, dunes, sands		1	0	1	0	1	1	3	3		0	0	0	1	0	0	0	5	0	1	1		0	1	0	0	0	0	0	0	0	0	0	0	1	0		5	4	4	0	2	2
Burnt areas		0	0	3	0	0	0	2	1		0	1	0	0	0	0	0	0	0	0	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	5	0	0	0
Sparsely vegetated areas		1	1	1	1	1	0	2	3		0	1	0	1	0	0	0	1	0	1	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1	4	0	2	0
Moors and heathland		4	3	5	5	4	5	3	4		3	4	0	2	4	3	0	2	2	2	3		0	2	0	2	0	0	2	0	0	1	0	0	0	0		5	4	5	1	2	5
Natural grasslands		4	3	5	5	4	4	3	5		3	2	0	1	5	5	5	1	0	1	2		0	0	1	3	0	0	0	0	0	5	0	0	0	0		3	4	5	1	4	3
Sclerophyllous vegetation		3	2	2	4	2	3	3	4		1	2	0	1	0	0	0	1	2	2	3		0	0	0	2	0	0	2	0	0	1	3	0	0	0		2	3	4	1	2	4
Transitional woodland-shrub		3	2	2	4	2	3	3	4		0	1	0	0	0	0	0	0	2	2	3		0	1	0	2	1	0	2	0	0	1	0	0	0	0		2	3	4	1	2	2
Water bodies		4	2	4	3	0	4	4	4		1	2	0	2	0	1	0	1	0	3	5		0	0	0	0	0	0	0	3	5	4	0	5	0	5		5	4	4	0	3	4
Water courses		3	1	1	3	0	3	4	4		0	1	0	1	3	3	0	2	0	3	5		0	3	0	0	0	0	0	3	0	4	0	5	0	5		4	4	4	0	3	5
Coastal lagoons		5	4	4	3	0	5	4	4		0	1	0	0	0	0	0	4	0	3	5		0	1	0	0	0	0	0	4	5	4	0	0	0	0		4	4	4	0	2	4
Sea and ocean		3	2	1	4	0	3	2	2		5	3	0	0	0	5	0	0	0	3	5		0	3	1	0	0	0	0	5	5	0	0	0	1	3		4	5	4	0	4	2
Salt marshes		3	2	5	3	4	3	2	3		0	1	0	0	0	2	0	5	0	2	2		0	0	0	2	0	0	0	0	0	0	0	0	0	0		3	2	3	0	2	0

*Very important ES in some ecosystems, but there is potential for double counting;

**Potential for double counting when fodder is used for feeding in the same farm;

***Often not counted as ES, but may be important in policy and land-se decision-making (Burkhard & Muller, 2015).

Source: (Burkhard & Muller, 2015); adapted by the author according the land cover types present in the Shkumbini basin according Corine 2012

Differently from the demand matrix, the supply matrix contains also the supporting ecosystem services under the heading of Ecological Integrity. The supporting services guarantee the proper performance of the other ecosystem functions and services and as there is no human demand for support functions, their values as ES is assessed indirectly as part of the other services. Because the Shkumbini basin does not contain (according Corine 2012) land cover types such as: infrastructures and transport, ports and airports, and continuous urban areas, the overall ecological integrity seems to be in a better position than that of more complex regions. In fact, the territory is also covered by a road network that culminates in the and around the urban areas, but having little access to the more rural areas. Furthermore, the relative small size of the city of Elbasan and the informal sprawl of suburban settlements around the city and in the agriculture valley lead to a classification of the built fabric as discontinuous rather than continuous, therefore eliminating some of the very low (-5) scores of the continuous urban fabric from the overall picture.

The supply matrix shows the high diversity of services that certain ecosystems, such as forests of any type (broad-leaved, coniferous and mixed) provide, together with the high-to-maximal capacity of provision (Burkhard & Muller, 2015). In this respect, forests are ranked first, followed by territories of other types of vegetation, such as natural grassland and moors and heathlands. The human demand for forest ecosystem services, on the other hand, is absent with the exception of the relatively low demand (-1) for typical forest provisioning services such as timber, wood for fuel and wild foods and resources. In the case of Shkumbini basin, the findings from interviews and focus groups with forest users / commoners reflect the demand matrix for forest ecosystem services, with a slight difference – though not rationally aware of the concept of ecosystem services, most of the commoners protect the forest mainly for historical, cultural and spiritual purposes, rather than for the provisioning services (see more details in the SESMAD variables discussion in section 4.3.2).

Figure 30. Land cover types (Corine) in Shkumbini basin and their ES demand

Land cover types (Corine) and their demand for Ecosystem services (0 - no relevant demand and 5 - maximum demand)	Regulating services	Global climate regulation	Local climate regulation	Air quality regulation	Water flow regulation	Water purification	Nutrient regulation	Erosion regulation	Natural hazard regulation	Pollination	Pest and disease control	Regulation of waste	Provisioning services	Crops	Biomass for energy	Fodder	Livestock (domestic)	Fibre	Timber	Wood Fuel	Fish, seafood & edible algae	Aquaculture	Wild foods and resources	Biochemicals and Medicine	Freshwater	Mineral resources	Abiotic energy sources	Cultural services	Recreation and tourism	Landscape aesthetics & inspiration	Knowledge systems	Religious & spiritual experience	Cultural heritage & cultural diversity	Natural heritage & natural diversity
		9	10	11	12	13	14	15	16	17	18	19		20	21	22	23	24	25	26	27	28	29	30	31	32	33		34	35	36	37	38	39
Non-irrigated arable land		2	2	1	2	0	3	2	3	3	3	2		1	1	0	0	0	0	0	0	0	0	1	0	0	1		0	0	1	0	1	0
Complex cultivation patterns		1	1	1	1	2	5	1	2	3	3	2		1	2	0	0	0	0	0	0	0	0	1	1	0	0		0	0	1	0	1	0
Agriculture and natural vegetation		2	1	1	0	2	3	1	1	2	3	1		1	2	0	0	0	0	0	0	0	0	1	2	0	2		0	0	1	0	0	0
Pastures		3	1	0	1	2	1	0	2	0	1	3		0	1	3	1	0	1	0	0	0	0	1	2	0	2		0	0	1	0	1	0
Fruit trees and berry plantations		1	2	1	0	2	3	1	3	5	3	1		1	2	0	0	1	1	0	0	0	0	2	3	0	0		0	0	2	0	2	0
Olive groves		1	2	1	0	2	2	0	3	2	3	1		1	1	0	0	1	0	0	0	0	0	2	1	0	0		0	0	2	0	2	0
Vineyards		2	5	1	0	4	3	5	3	2	3	1		1	2	0	0	1	1	0	0	0	0	2	4	0	0		0	0	2	0	3	0
Industrial or commercial units		5	1	5	4	3	3	1	5	4	3	4		5	5	5	5	5	5	5	4	4	4	5	5	5	5		1	1	4	1	3	1
Mineral extraction sites		0	0	0	2	0	0	4	3	0	0	3		0	3	0	0	1	2	0	0	0	0	0	2	1	0		0	0	0	0	0	0
Discontinuous urban fabric		3	5	5	5	2	2	1	4	4	4	2		4	4	2	4	3	3	3	4	4	4	5	5	3	3		4	4	3	3	2	3
Broad-leaved forest		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	1	1	0	0	1	0	0	0	0		0	0	0	0	0	0
Coniferous forest		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	1	1	0	0	1	0	0	0	0		0	0	0	0	0	0
Mixed forest		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	1	1	0	0	1	0	0	0	0		0	0	0	0	0	0
Beaches, dunes, sands		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	1	0	0	0	1
Burnt areas		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Sparsely vegetated areas		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	0	0	0
Moors and heathland		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	2		0	0	0	0	0	0
Natural grasslands		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	2		0	0	0	0	0	0
Sclerophyllous vegetation		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	0	0	0
Transitional woodland-shrub		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Water bodies		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	0		0	0	0	0	0	0
Water courses		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	3		0	0	0	0	0	0
Coastal lagoons		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	0		0	0	0	0	0	0
Sea and ocean		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	4		0	0	0	0	0	0
Salt marshes		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0

Source: (Burkhard & Muller, 2015); adapted by the author according the land cover types present in the Shkumbini basin according Corine 2012

Figure 31. Land cover types (Corine) in Shkumbini basin and related ES supply - ES demand budgets[56]

Land cover types (Corine) and their supply - demand budgets for Ecosystem services (-5 - demand fully exceeds supply = undersupply; 0 - demand and supply are equal hence the budget is neutral; blank - supply and demand are both 0; 5 - supply fully exeeds demand - oversupply)	Regulating services	Global climate regulation	Local climate regulation	Air quality regulation	Water flow regulation	Water purification	Nutrient regulation	Erosion regulation	Natural hazard regulation	Pollination	Pest and disease control	Regulation of waste	Provisioning services	Crops	Biomass for energy	Fodder	Livestock (domestic)	Fibre	Timber	Wood Fuel	Fish, seafood & edible algae	Aquaculture	Wild foods and resources	Biochemicals and Medicine	Freshwater	Mineral resources	Abiotic energy sources	Cultural services	Recreation and tourism	Landscape aesthetics & inspiration	Knowledge systems	Religious & spiritual experience	Cultural heritage & cultural diversity	Natural heritage & natural diversity
		9	10	11	12	13	14	15	16	17	18	19		20	21	22	23	24	25	26	27	28	29	30	31	32	33		34	35	36	37	38	39
Non-irrigated arable land		-1	0	-1	-1		-3	-2	-2	-3	-1	0		4	1	3		5						0			-1		1	1	1		2	
Complex cultivation patterns		0	1	-1	0	-2	-5	-1	-1	-3	0	0		3	-1	3		4						1	-1				2	2	1		2	
Agriculture and natural vegetation		0	2	0	2	-1	-3	2	0	-2	0	0		2	0	2	3	4	3	3				3	0	-2	-1		2	2	2		2	3
Pastures		-2	0		0	-2	-1	4	-1		1	1			0	2	4		-1						-1	-2	-2		3	2	1		2	
Fruit trees and berry plantations		1	0	1	2	-1	-2	1	-1	0	0	1		4	-1			-1	3	4					-2	-3			5	2	0		2	
Olive groves		0	-1	0	1	-1	-1	1	-3	-2	0	1		3	0			-1	4	4					-2	-1			5	2	0		2	
Vineyards		-1	-4	-1	1	-4	-3	-5	-3	-2	-2	0		3	-1			-1	-1	1					-2	-4			5	2	0		2	
Industrial or commercial units		-5	-1	-5	-4	-3	-3	-1	-5	-4	-3	-4		-5	-4	-5	-5	-5	-5	-5	-4	-4	-4	-5	-5	-5	-4		-1	0	-4	-1	-2	-1
Mineral extraction sites					-2			-4	-3			-3			-3			-1	-2						-2	4	5				1			
Discontinuous urban fabric		-3	-5	-5	-5	-2	-2	-1	-4	-4	-4	-2		-3	-3	-1	-4	-3	-3	-3	-4	-4	-3	-5	-5	-3	-2		-1	-2	-2	2	-1	-3
Broad-leaved forest		4	5	5	2	5	5	5	3	5	4	4			1	1			4	4			4	5					5	5	5	3	3	5
Coniferous forest		4	5	5	2	5	5	5	3	5	4	4			1	1			4	4			4	5					5	5	5	3	4	5
Mixed forest		4	5	5	2	5	5	5	3	5	5	5			1	1			4	4			4	5					5	5	5	3	4	5
Beaches, dunes, sands					1				5		1	1			1											1			4	3	4		2	1
Burnt areas			1									1																			5			
Sparsely vegetated areas			1		1				1		1	1															-1			1	4		2	
Moors and heathland		3	4		2	4	3		2	2	2	3			2		2			2			1				-2		5	4	5	1	2	5
Natural grasslands		3	2		1	5	5	5	1		1	2				1	3						5				-2		3	4	5	1	4	3
Sclerophyllous vegetation		1	2		1				1	2	2	3					2			2			1	3			-1		2	3	4	1	2	4
Transitional woodland-shrub			1							2	2	3			1		2	1		2			1						2	3	4	1	2	2
Water bodies		1	2		2		1		1		3	5									2	5	4		5		5		5	4	4		3	4
Water courses			1		1	3	3		2		3	5			3						2		4		5		2		4	4	4		3	5
Coastal lagoons			1						4		3	5			1						3	5	4						4	4	4		2	4
Sea and ocean		5	3				5				3	5			3	1					4	5				1	-1		4	5	4		4	2
Salt marshes			1				2		5		2	2					2												3	2	3		2	

Source: (Burkhard & Muller, 2015); adapted be the author according the land cover types present in the Shkumbini basin according Corine 2012

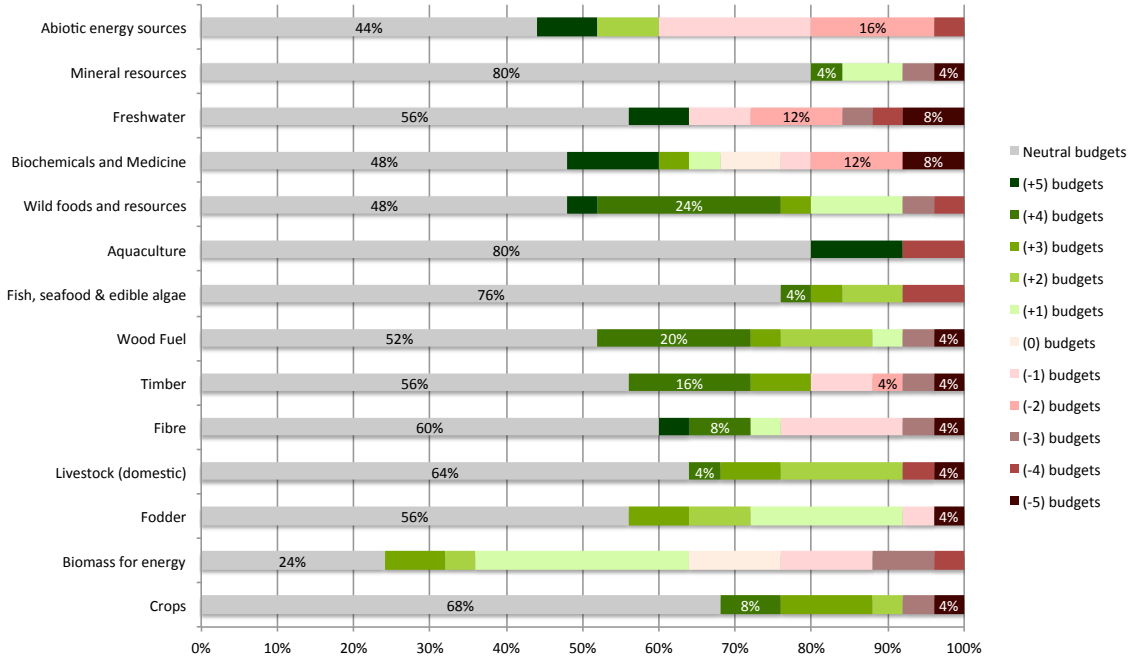
The demand for all ecosystem services is high-to-maximal in the case of the urban fabric and industrial sites, followed by agriculture, pastoralism, orchards and

cultivation activities, for which, both diversity of the need for ES is reduced and pressure for ES falls between relatively low to moderate.

Figure no. 31 provides the supply-demand budgets, showing very high levels of ecosystem services undersupply for the industrial/commercial and urban areas, and very high levels of ES oversupply in the case of forests. While the above relationships between land cover types and the ecosystem services are common for various territories, regardless of their location, it is important to analyse these relations vis-à-vis their specific locations in the basin and the environmental problems that exist in the basin. After all, due to geography and the size of the LULC, each territory displays differently in terms of risks and policy recommendations that follow the analysis of relations between ES supply – ES demand budgets. In the case of Shkumbini basin, this analysis is made by exploring the following steps:

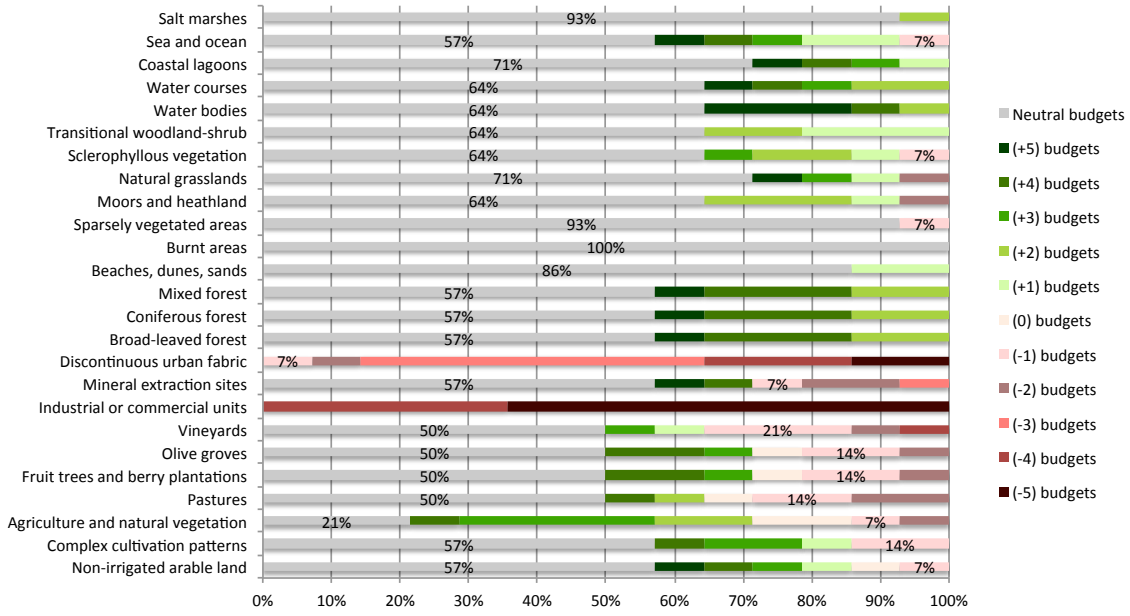
- The understanding of the ES supply – ES demand budgets for each of the ecosystem services. This brings to an overall idea of the pressure and therefore quality and risks for the ES services within the basin, based on the proportion that each budget (positive-neutral-negative) takes within the overall budget for that given service. The representation of this analysis is made through the graphs 32, 35 and 37, and is separate per each group of services – i.e. the regulating, the provisioning and the cultural services.
- The understanding of the contribution of the land cover types on the ES supply – ES demand budgets for the total of each group of services, i.e. the contribution through positive-neutral-negative budgets on the regulating services, on the provisioning services and on the cultural services. Graphs 33, 36 and 38 provide the respective figures.
- The interpretation of the findings from the first to steps on the specific territory – i.e. the Shkumbini basin, by referring to data on the size of the land cover types, and especially on the location within the basin. For this purpose, besides the land use maps at basin level (according Corine 2012 LULC), a set of 31 maps (one per each ES[57]) was prepared. All maps are presented in the Annex 1.

Figure 32. ES supply - ES demand budgets of Corine LULC in Shkumbini basin, per each of the provisioning services



Source: own calculations based on the (Burkhard & Muller, 2015) matrix

Figure 33. The contribution of Corine LULC types on the ES supply - ES demand budgets of Shkumbini basin for the total of the provisioning services



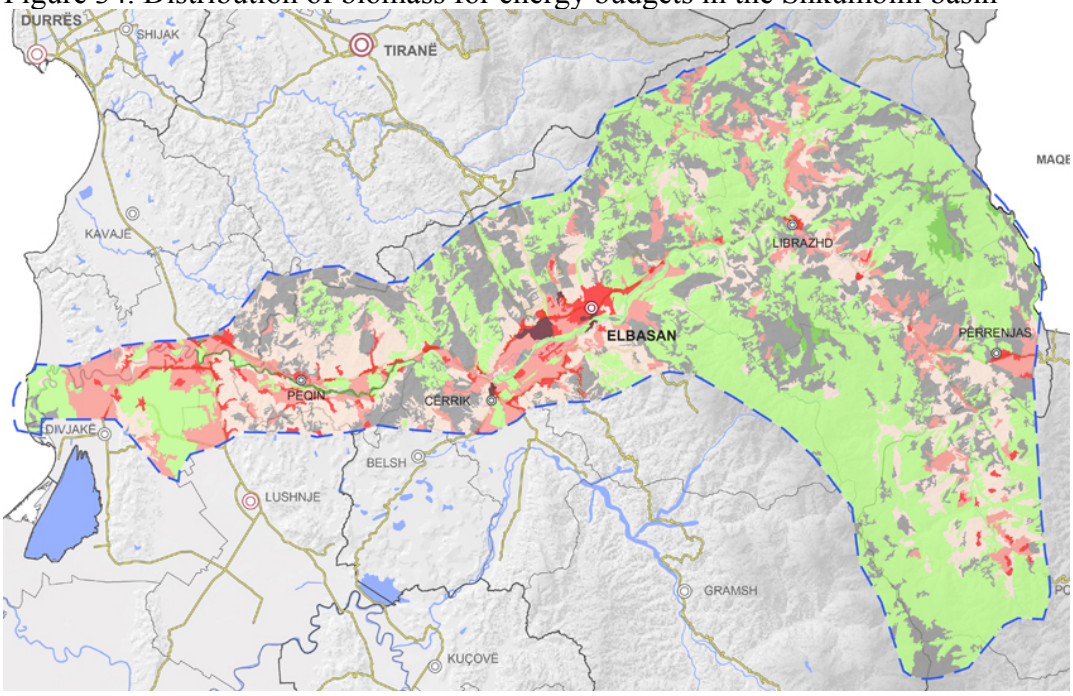
Source: own calculations based on the (Burkhard & Muller, 2015) matrix

The data show that neutral budgets – i.e. no relevant supply of ES and no relevant demand for ES, are dominant in the case of almost all provisioning services. This means that at least 45% of the land cover types contribute to all provisioning services with neutral budgets – i.e. neither provide services, nor demand services. The only

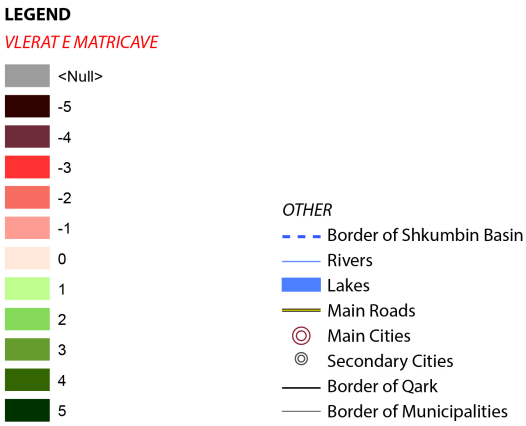
exception is in the case of biomass for energy, where a balance between land cover types that provide relevant services and those that demand services is present.

The visualisation of the biomass for energy on the basin's map, shows that both the neutral and the 0 budgets (demand=supply) are present in the collection zone of the basin, at altitudes of 100-400 meters above sea level. From a land use perspective, these areas contain agriculture and low vegetation, but no forests. The conveyance zone, on the other hand, is located at altitudes of 0-200m above sea level, it has mainly urban, industrial, rivers and lowland agriculture activities, and it is also characterise by the presence of negative budgets for biomass for energy. The supply of biomass for energy is assessed as relatively low to moderate and in all cases is provided by forests located in the basin's undisturbed contributing zone (up to 2000m above sea level), far from the urban areas, but prone to urban pressures. In the next chapter, the discussion on forest management will reveal those pressures, which could be for now summarised as deforestation and informal forest cutting, in forest areas far from the human eye and in absence of a proper governance system to ensure their protection.

Figure 34. Distribution of biomass for energy budgets in the Shkumbini basin



Source: own graphical elaboration based on the (Burkhard & Muller, 2015) matrix



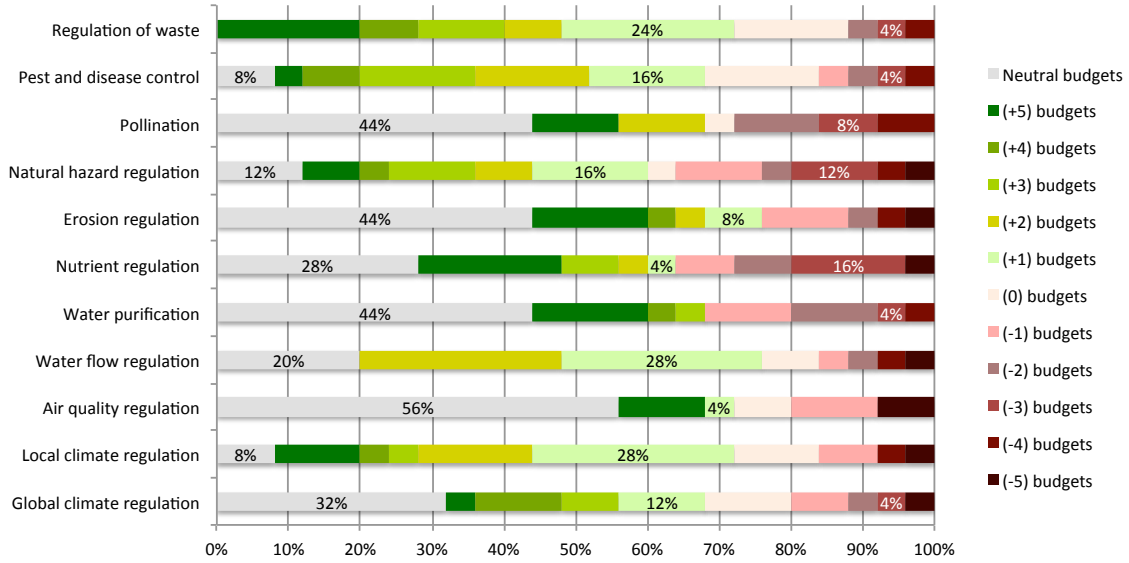
In the case of crops, the map (no.20 in the Annex) and the graph 32 show that most of the territory is not suitable for agriculture – the latter being located in the conveyance and collection zones and around the Shkumbini delta. However, graph 33 shows that agriculture land uses have a better representation of the positive supply-demand budgets versus the negative ones, the neutral being excluded. Freshwater (map no.31 in the Annex) is one of the most controversial services in the basin. The urban, industrial, commercial and agricultural sites surround the main sources for its provision (the river and its branches), placing enormous pressure on water supply, quality and availability. A significant portion of the water supply comes from the forest area – the largest area in the basin, which has also a vital role in water purification, local climate regulation and hence on water availability. The separation between the river and the forest area on the map is in fact only visual, and the regulating services reveal the very important and strong ties between freshwater and forests. This amplifies the fact that the sustainable governance of forests and other natural vegetation areas, which have a strong impact on water availability and quality, should follow water management. This is very important not only for guaranteeing water to the population, but also for the biodiversity and fishing activities in the basin's inland waters (lakes and rivers). Elbasan has significant fishing capacities in the inland waters, but Korça has at least four times more, due to lake waters. (INSTAT, 2016) Fier on the other hand has access to sea (Shkumbin has its delta in the Adriatic) and therefore, fishing capacities are in total quite significant and diverse (INSTAT, 2016).

Some of the very important provisioning services of forests are timber, wood fuel, wild foods and resources and biochemical and medicine (Maps no.25, 26, 29 and 30 respectively, in the Annex 1). In the case of timber, the number of land cover types

that contribute with positive budgets balances those that contribute with negative budgets. The total area of forests is however much larger than the area of demand – urban and industrial and to a lower degree also pastures and vineyards. The land cover types that demand and result in negative budgets for wild resources and wood fuel are fewer compared to those the result in positive budgets, because besides forest, orchards and most of the areas of low vegetation and shrubs contribute to the supply for these services as well. The situation is reversed though in the case of biochemical and medicines provisioning service, where orchards, pastures and agriculture contribute with negative rather than positive budgets.

In the case of regulating services, the situation is mixed, varying from services that receive mostly positive budgets from the land cover types, to those with a dominance of the neutral budgets (i.e. air quality regulation) and those where the contribution of land cover types with negative budgets is noticeable (for instance nutrient regulation, natural hazard regulation and water purification), though not the most dominant one. The matrix of ES supply – ES demand budgets shows for a division between two almost distinct groups of land cover types in terms of budgetary contributions on all regulating services. With the exception of few services, agriculture, orchards, vineyards, urban areas and industrial and commercial sites are LULC that place pressures on the regulating services. Forests, different vegetated areas and waters do provide services to the regulating services, and in the worst case they display neutral budgets for some of the services. This is not however the case for forests, that have always budgets of above 2, and mostly 4 and 5 for all regulating services. This shows the great role of forest ecosystems in the overall performance of the different ecosystems, by supporting them to carry out properly their functions and be able to accommodate human demand, without compromising the supply levels.

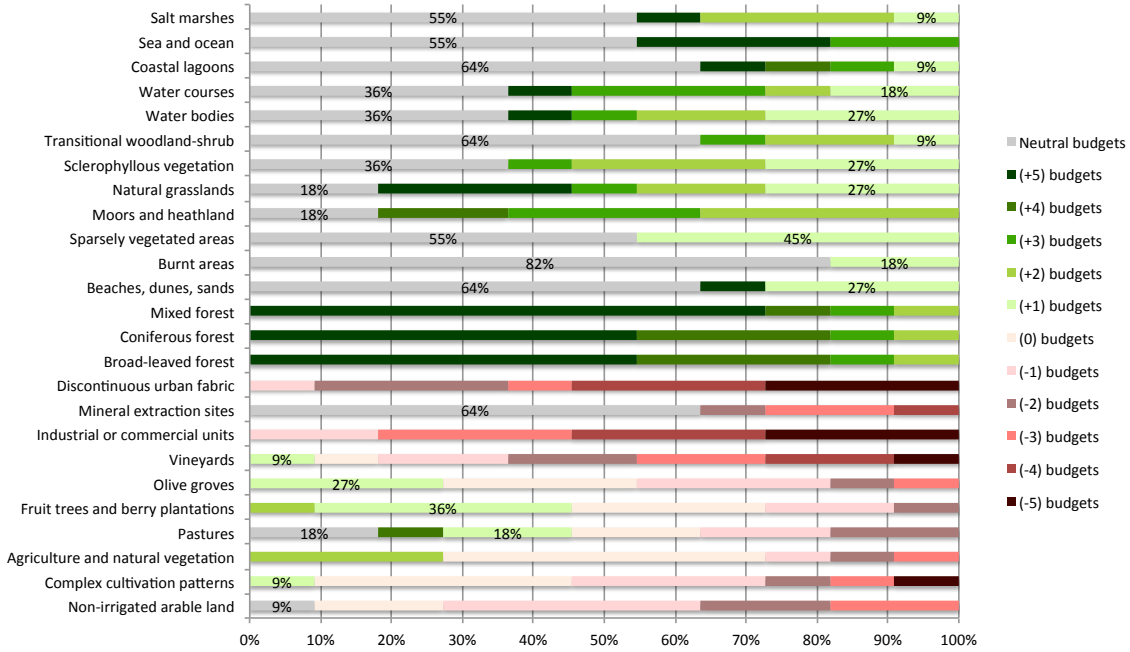
Figure 35. ES supply - ES demand budgets of Corine LULC in Shkumbini basin, per each of the regulating services



Source: own calculations based on the (Burkhard & Muller, 2015) matrix

In the case of waste regulation service, 72% of the LULC contribute with positive budgets, while only 12% contribute with negative ones. This 12% is composed of the urban areas, the industrial sites and mineral extraction, all located along the river Shkumbin, in Elbasan, Peqin dhe Rrogozhinë (key cities), and around the settlements on agriculture land (map no.19 in the Annex). Erosion regulation (map no.15 in the Annex) is clearly carried out by wood vegetation, either forests (of any type), or orchards. Pastures and natural vegetation do play an important role as well. On the other hand, any human-made activity, such as intensive agriculture, industrial and urban areas, has a very negative effect on erosion regulation. The map shows that the areas with negative budgets are located either on the conveyance zone or on the lowlands close to the river delta, around the areas with the highest concentration of the population and with productive agricultural activity. These areas are prone to floods and geological hazards related to erosion and are mostly surrounded by the land cover types with neutral budgets, or in the best cases with vegetation that provides relatively low supply (values of 1 or 2 in the matrix). This raises the need for increasing the forest area, to bring it closer and adjacent to the high-demand, high-risk and erosion prone areas.

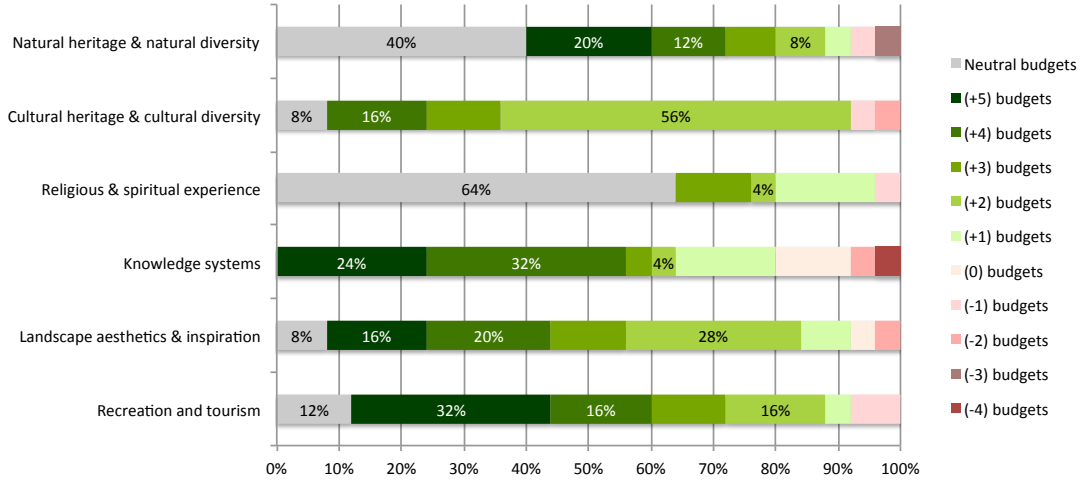
Figure 36. The contribution of Corine LULC types on the ES supply - ES demand budgets of Shkumbini basin for the total of the regulating services



Source: own calculations based on the (Burkhard & Muller, 2015) matrix

In the case of cultural and cognitive development services, all land cover types, with the exception of urban and industrial sites, show for positive budgets, often with matrix scores of higher than 3. Forests, natural vegetation and waters are the land cover types to offer positive budgets to most of the services.

Figure 37. ES supply - ES demand budgets of Corine LULC in Shkumbini basin, per each of the cultural and cognitive development services

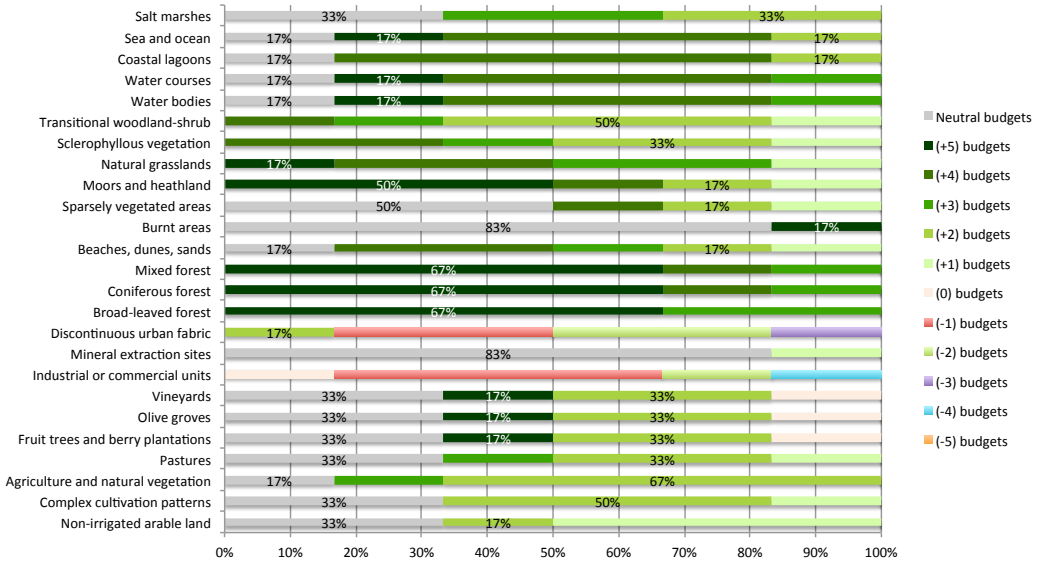


Source: own calculations based on the (Burkhard & Muller, 2015) matrix

This group of services alone is sufficient to advocate for the protection of the areas with natural vegetation and water. The contribution of natural resources to tourism has significant local economic development effects, while the contribution to

landscape aesthetics and knowledge systems is strongly related to the creation of capacitated human resources. In the case of Shkumbini basin, the capacity for tourism development is high in the whole area (map no.34 in the Annex 1).

Figure 38. The contribution of Corine LULC types on the ES supply - ES demand budgets of Shkumbini basin for the total of the cultural and cognitive services



Source: own calculations based on the (Burkhard & Muller, 2015) matrix

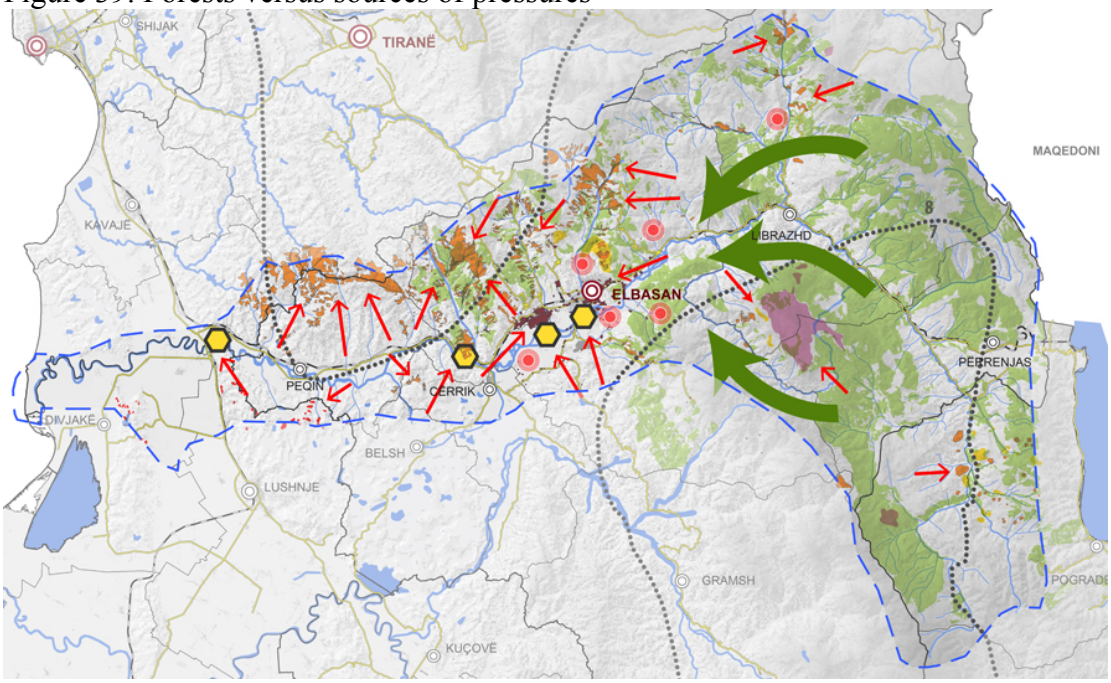
The above analysis shows that while forests have a highly significant protective role in the basin, the urban settlements, the areas of economic development and the economic interests place provisioning pressures. The latter affect not simply the provisioning ecosystem services, but also the regulating and the cultural ones. As a summary to this analysis, the following map provides a visual interpretation of the forests (their location) and the major sources of pressures (pollution and hot spots, the urban areas, and hazards). Next to the visual interpretation, the overall situation of forest conditions and governance in Albania is summarised through the following DPSIR diagram. The response is provided in four groups, therefore separately for the driving forces, the pressures, the state and the impact. The drivers and the pressures could be classified in the following subgroups:

- Agriculture, fishing and pastoralism, both intensive farming and traditional village-based. This leads to land conversion and deforestation as well as to ecosystem alterations, without necessarily changing the use of land;
- Urbanization and development of different types of industries, including property development, logging and use of timber in production processes,

which further impact the conversion of forest land into other uses and leads to deforestation;

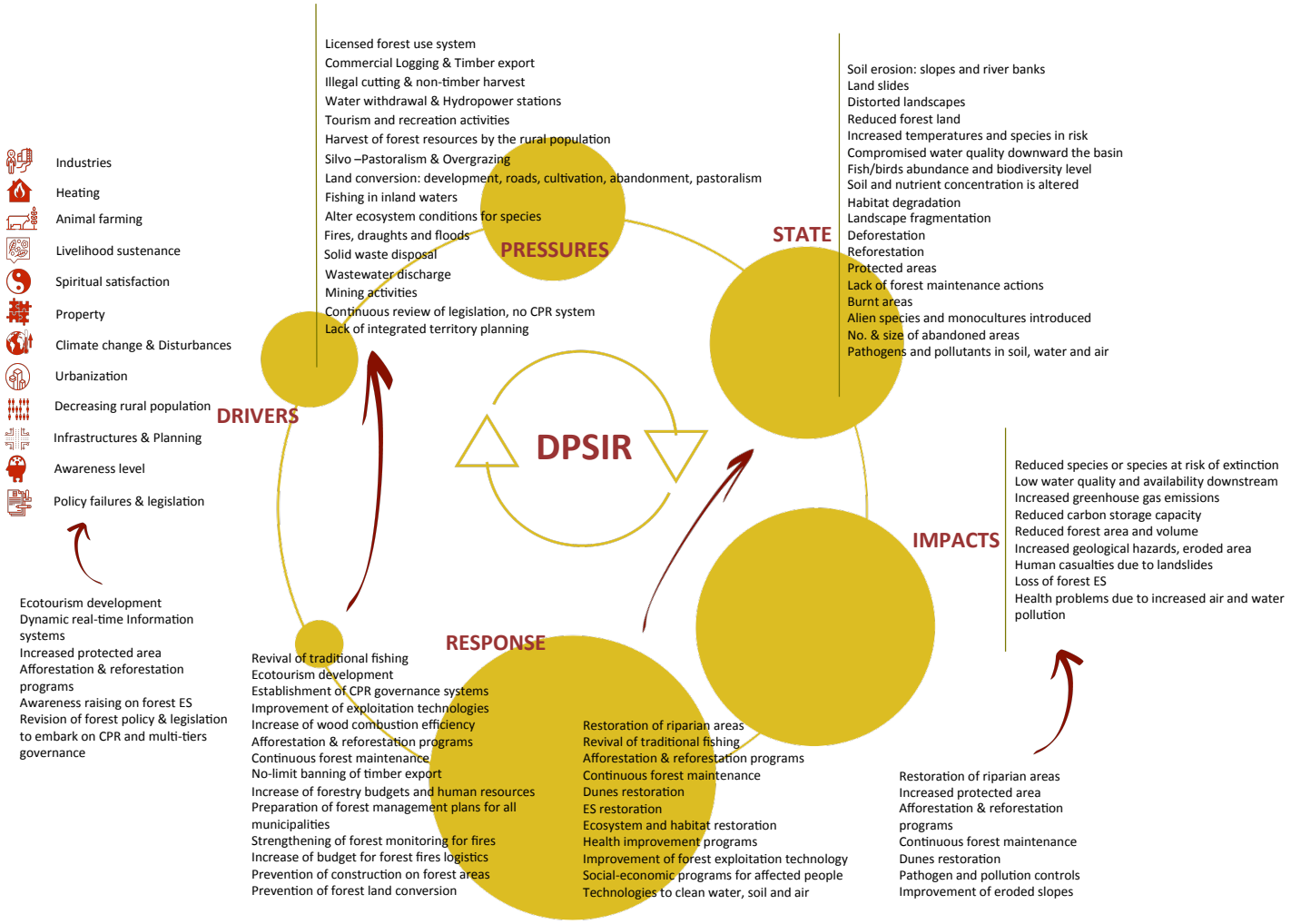
- The path of local and national policies and planning instruments, which favour certain land uses over others and lead to governance frameworks in place;
- Population dynamics, such as migration and change of employment patterns. As a result, people may loos bonds with forests;
- Cultural, historical and personal development patterns that push people towards protecting or abandoning forests.

Figure 39. Forests versus sources of pressures



Source: Corine 2012, SHGJSH 2015, and own graphical interpretation

Figure 40. DPSIR analysis for the Shkumbini basin forests



Finally, it is important to note that the national government, the municipalities and forest users themselves are currently implementing few of the above responses. Hence, most of the responses are missing to date and could in fact serve as a platform to be used by the government/s in supporting the governance of forests in the basin and in Albania. The following section elaborates further the discussion on the understanding of the forest governance system and drivers and pressures on forest in the Shkumbini basin. Often, where it is possible, parallels will be drawn to the condition of forest governance in Albania.

4.3 Discussion

4.3.1 The 8 Design Principles of robust governance applied for Shkumbini basin and Albanian forests

The following text analyses the typology of forest commons in Albania and in the Shkumbini river basin, by discussing each of the 8 design principles that Elinor Ostrom posited in 1990 on the robustness and endurance of self-organised common property institutions. There will be a simultaneous discussion of two concurrent types of arrangements on the governance of forests – 1) the village based commons' regime; 2) the municipal management and licensed rights granted by the municipality. The two types are implemented under the municipal governance frame and will be described in parallel and confronted for each of the design principles. The two types are coexistent, with the second currently prevailing over the first, due to the national regulatory framework in place and its evolution in the last 15 years.

Based on the logic of Morris Cohen in Raymond (2003), the evolution of the Albanian forests legislation shows that the government is mainly applying an instrumentalist approach of property. The latter is a "construct of the government and exists at the continued pleasure of the political system. The instrumentalist supports changing public priorities by adjusting the powers of ownership and even redistributing privately owned resources over time" (Raymond, 2003). Elements of this approach will become mostly evident in the next session, where further variables of the forest governance based on the SESMAD approach shall be discussed.

The municipality, as a public body has the responsibility in managing the forests. However, as the law has created the so-called licensed rights (GoA, 2005) (Raymond, 2003), the municipality is assigning sets of rights to different users, being those local communities and/or farmers, or other interested "appropriators" (Ostrom, 1990). Alternatively, one could consider the first typology of arrangements as "forest managed in common by the villagers" and the second as "forest managed through licensed rights by various appropriators and the municipality". Finally, though is not a key subject to this research, a short description of private forests management will also appear. This is limited to users rights and boundaries, because it helps in providing a better understanding of how community bonds define and/or maintain users rights. Furthermore, as it will become obvious in the next paragraphs, the commons' system is also based on a concept of private property rather than on common management of the same 'piece of land'. The commons' users feel more secure and assume to have lower transaction costs when they manage individually portions of a common property/resource, rather than by managing together the resource as a whole.

Users Rights – well defined boundaries: The definition of users rights depends on: the extent and shape of the physical boundaries of the ecosystem at stake; the proximity of the users to the resource [the forest]; the property relations as defined by law and as arranged through an informal system of commons; the legislation system on forests and natural resources; and the historical traditional practices. From a DPSIR framework perspective the users rights can be considered as both drivers and pressures. Biophysical features of the resource and the proximity of users to the resource shape the driving interests of users versus exploiting forest resources and ecosystem services. The property relations as defined in either the legislation or in the traditional and historical interactions act as pressures on the resource. As it will be explained below, the spiritual and cognitive factors are exceptionally strong in profiling the link between users and forests. These factors, much more than the need for provisioning ecosystem services, guide the human pressure on the use of and care for forest resources.

The physical boundaries of forests are defined through the legal definition on forests, which excludes individual trees and coppices in agriculture land and in the forest cadastre database. The latter has been established prior 1990 and not renewed since. Any attempt

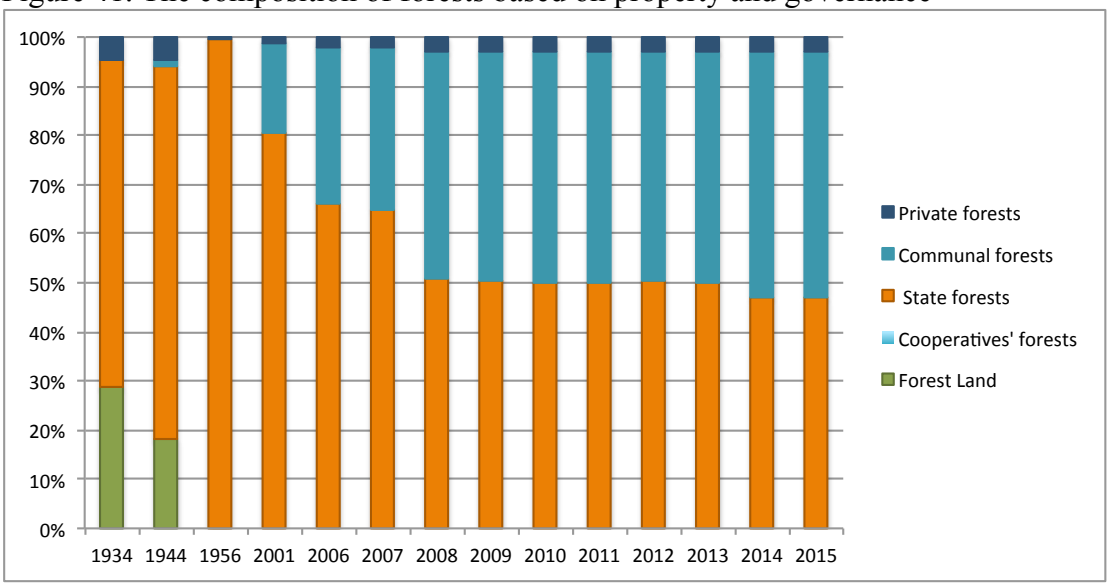
to rebuild a database after 1990 has made use of satellite imagery without any fieldwork follow-up, therefore not being classified as appropriate for an official forest cadastre reference. The lack of a recent forest cadastre makes it hard for authorities and researchers to come up with proper assessments, policies and scientific work on the conditions of forests and related services in Albania. On the other hand, it is the historical knowledge of the foresters and local people that some how fills in the gap created by the lack of official information. This leads to a mixture of institutional management with add-hoc and people's based management of forests.

Authorities have geographical coordinates for the environmentally protected forests that are under the state ownership (AKZM, 2016). People can freely enter into these forests for walking, hiking and camping, as long as they do not exercise any other activity of exploitation character in these areas. Barbeques and camping fires are not allowed and in some of the forests camping is restricted too. Visitors may pay a fee to visit national park forests, but this is not applied in all of the cases and depends on the agency that is managing the park. The fees are usually 1-2 euros per visitor or car and there are no time restriction applied once you are in the park. Withdrawal activities are not allowed in the environmentally protected forests and the national agency and regional branches for protected areas manage these sites. They may also set exclusion rules for access to certain areas or parts of an area, depending on the biodiversity value and ecosystem services they wish to safeguard. The level of accessibility and protection depends on the features of each area and a classification provided for them in the legislation (AKZM, n.d.) (AKZM, 2015) (GoA, 2002)[58].

In the case of privately owned forests, all user rights belong to the owner and no one else can enter the property. There are two cases of 'privately owned' forests: (i) Transfer of property to the owner has concluded. These constitute 3% of forest area in Albania (INSTAT, 2016). (ii) Transfer of property to the owners has not occurred yet, but there is common historical knowledge on the right of full ownership. The "owner" has in most of the cases old documents that show his/her property rights and whose validity can only be established by a court. However, the neighbours know about this 'heritage' and freely accept the conditions set by the 'owner' on the property. In both cases the owner strictly

prohibits others from entering his forest. Therefore, all other uses are an exclusivity of the owner only.

Figure 41. The composition of forests based on property and governance[59]



Source: (Muharremaj, 2003); (INSTAT, 2016); own calculations.

Seldom, in the more hilly areas, the owner fences his property. In the more mountainous settings, the owner does not fence the forest. However, in several cases, one can notice stones placed in a small pyramid-like composition along the perimeter of the property boundary. This stones' composition is inherited since the early 1400s (for what is known), as defined in the *kanun* provisions. The same boundary marking is applied to pastures, though mainly for limiting users' rights rather than delineating a territory of full ownership. In other cases the owner places a signboard with "private property" written on it, simply as a warning sign. The owner monitors daily the forest to make sure others are not entering, or harvesting it. The owner may do so by him/herself, or hiring a watchman. The latter happens rarely and it is mostly applied to those cases where the owner has moved to an urban area and is not able to monitor and safeguard daily his property. The owner is responsible of maintaining the health of the forest and harvesting it, in compliance with the legislation and other technical provisions set by the respective municipality. The forest engineers from the municipality refer to these properties as private properties in the municipal forest management plan and help the owners in preparing annual harvesting and maintenance plans for their own forest, in line with the municipal plan.

In the case of municipal forests, access is free for all and includes walking, hiking, bird and biodiversity watching, hanging around and picnic. Camping is usually allowed upon permission by the municipality in case it involves massive and long-term camping, but over-night stays of small groups in tents take place freely. The municipality manages the forest produce and maintenance activities either by itself (own forests' enterprise or annual contracts), or through 'transferring' rights (common management or licensed rights[60]). The municipality transfers rights to one forester, a group of families, or a village. The right are transferred primarily to those who live close to the forests location, thus emphasising the 'proximity' feature, but there is no discrimination of other users, wherever they live. The licensed rights are rather short-term (one-three years) and include [sanitary] cutting and selling of the timber, next to some minor forest maintenance activities. The municipalities adopt a system of combined intrinsic and instrumental allocation rules (Raymond, 2003), thereby favouring first those who are classified as historical users or owners of the forests (priority allocation); then favouring those who live close to the forest (instrumental, class-based); and then defining a set of technical criteria that each group of users has to fulfil (MoE, 2016). The law regulates the process, but it is the public auction that defines the final beneficiaries (those who are granted licensed rights).

If the forest is managed in common by the village, then walking is usually possible for hikers. Still it is always better and advisable that the visitor either is accompanied by a villager, or notifies on his intention the alderman or some one else who is well known to the village and will spread the news to the others. The commoners easily accept foreigners to use the forest as a recreational space on particular days, such as national celebrations. They also have a sense of proudness for these particular moments, considering it an appreciation to their forest. However, beyond these specific events, they exercise daily cautious observations to define whether someone else can enter and walk freely in the forest or not.

The municipalities monitor the forests for eventual fire risks and set warning signs against fire placing activities, including excursionists who may organise barbeques. In the case of CPR forests, the municipalities still monitor, but the forest shareholders take care of monitoring and preventing fires. If the forest is managed in common, than the villagers

cover the cost of fire prevention and mitigation (GoA, 2010). In practice, the villagers are highly vigilant on forest fires for the common forests, and when possible they also help the municipality to manage fires in non-common forest, especially when the latter are close to their properties.

Private owners can sell their property, but holders of proprietary rights have no alienation rights. Municipalities cannot sell for legal reasons, but also because the forest property registration is far from being completed. However, municipalities can propose, through the territorial planning instruments, a change of use for the forest area. The Minister responsible on forests, or the Council of Ministers has the right to approve the conversion based on the size of the respective forest area (GoA, 2005). The conversion brings along changes on property and users' rights.

The intention to manage forests in common is historical, as are some of the procedures that villagers implement among themselves. However, the role of donor projects for the last 20 years has helped in this regard by promoting foresters to manage the forest in common, raising capacities, helping in the establishment of forest users association and providing funds for forest maintenance activities. There is criticism to the users associations as groups set through a top-down decision (the Ministry) and external injection by donors, thus being unsustainable in case of no funds.

Funds wise this is true, because the associations cannot carry out (so far) their ES protection and restoration function in absence of funds from donors and municipalities. The members of the associations are not able to establish forest maintenance funds – they rather contribute in kind through their work. On the other hand, the associations support the users with relevant knowledge; represent the users in higher levels of decision-making; constitute the legal bodies to benefit from any funding source made available locally to support forest governance; have institutional memory of the forest commons in Albania for the last 28 years; have practical knowledge on the forest CPRs and keep updated on local forest conditions; supply the national forest federation with local information on forests health and management; have technical knowledge on forest management (the head or a member is forestry expert); and can easily resume their activities in forest maintenance, when funding is available. When the associations have

access to funds, they cooperate with the forest users and together they carry out withdrawal and management activities as foreseen by the law.

The legislation provides criteria and rules for the procedures that a municipality has to implement when giving a forest area in use. These procedures have changed in 2016, due to the forest moratorium law, to exclude companies that rent forest areas for timber commerce and export. The moratorium is in force since only one year and therefore it is difficult to provide a complete and neutral assessment of its effects. GoA reports however that during February 2016 – January 2017 timber import has increased by 30% compared with the same period in the previous year; local timber exploitation has decreased by 3 times compared to 2015; and illegal cuttings have declined by 170% (AKM, 2016).

On the other hand, the current bylaws cover the exploitation of wood material for heating and sanitary cuttings and users' rights transfer to communities for shared management of the resource. In the first case (heating and sanitation), the municipality is responsible and carries out its function through a dedicated municipal enterprise, or contracting out the activity on an annual basis. Whichever is the case, the municipality is the one to designate the quantity of wood and the specific trees to cut. The municipality acts similarly for the non-timber wood products (GoA, 2016/b).

The transfer of users' rights is implemented for a period and within the scope defined in the 10-years forest management plans prepared by the municipality, for those activities that the forests legislation allows and that: significantly improve biodiversity in the forest; improve forests infrastructure and safety; and are not characterised by any conflict ownership (MoE, 2016). Initially, the municipality should designate the areas that are suitable for transfer of rights and have them approved by the Municipal Council. In reality, in absence of an updated and approved forest management plan, the municipalities do not follow the whole approval procedure. They rather 'grant' the rights informally to the users who live nearby the forest, those who traditionally maintained it or owned it. The commitment is made by word of mouth and the municipality is willing to have villagers take care of the forest, because in this way it lowers its burden of forest management in a context of limited funds and human capacities. To make sure the users take good care of the forest, the municipality carries out constant monitoring.

The users gain some withdrawal (for household needs only) and management rights and duties. They also gain exclusivity of access and the right the exclude others from using the forest. Entering the forest for walking is allowed, but as explained above it can hardly take place, once a forest is declared as protected/maintained by a user or group of users. The user/s have also the responsibility to cooperate with a forest engineer in drafting a forest rehabilitation action plan. Furthermore, they should protect the forest from fires and any harmful third parties activity. By gaining these rights, the users benefit both financially and in kind. By law, till 2016, the municipality would issue certificates of use to user' rights holders. Currently, it is the renting contract/agreement that guarantees the rights. (GoA, 2006)[61]; (GoA, 2016/a). Still, in absence of forest management plans (due to lack human and financial capacities), the transfer of rights happens through an informal system, constantly monitored by the municipality and based on gentlemen agreements[62].

Once a group of people are granted the users' rights on a forest, there is no any compulsory form of membership to the group. Nevertheless the granting that takes place through a usufruct rights contract between the group and the municipality contains the information on members/beneficiaries as an integral part of the contract. The internal group decisions are agreed among members and people record this information individually, each on their own ways. There are though cases where the village alderman, or a designated person within the group may record these decisions in a book of records. The families' shares are usually proportional to the size and needs of each family, but in all cases historical knowledge on the shared use of the resource is a key criteria. Once families enter in this common agreement, they do not sell rights to other possible members, because the law and the contract with the municipality will not allow for it. After all, the users never obtain full ownership on the forest and therefore cannot exercise alienation rights. The Municipality records the contracts for its own purposes, upon legislation, and therefore keeps track of its implementation. In other cases, in the absence of contracts, the municipality keeps track informally of the gentlemen agreement.

As a result, there are two parallel monitoring processes: (i) the one that members of a commonly shared forest informally carry out to verify that the resource is being used properly and as agreed between them; (ii) the one that the municipality implements to

verify that the contract it has with the foresters is being implemented properly (MoE, 2016), or the gentlemen agreement is followed up as agreed.

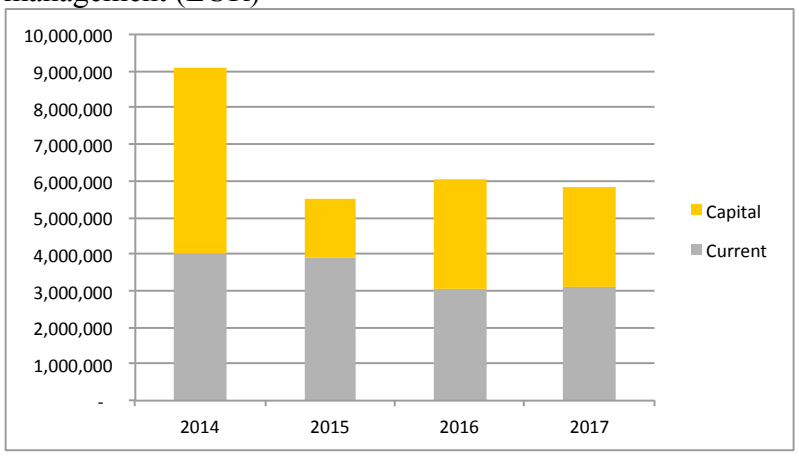
In the case of commonly managed forests, the beneficiaries live in the nearby villages – though not a legal conditionality, this is a practical criteria most municipalities use when giving users' rights to a group of people, basing their decision on traditional rights and ownership knowledge. However, in the case of private forests, or users' rights granted to one individual, the latter may also live in a nearby urban area. As a result, the number of urban "forest-owners" has increased overtime. Of course, one should keep in mind that: (i) the forest given for use through licensed rights had a short-term temporal dimension of usually 1-3 years. Therefore, the number of urban "owners" belonging to this category showed a high variation, as the next year, a forester from the rural area, could have applied for these rights; (ii) the urban owners of private forests have currently a tendency of returning to their village homes during spring and summer time, thus reflecting a seasonal pattern of physical proximity to the forest. During winter they organise daily or weekly visits, mainly to make sure none is entering their property.

Besides 'granting' users' rights to the village people, the municipality should also secure adequate quantities of wood for household heating. The right to sanitary cutting for creating supplies of wood for household heating is given to selected companies. Prior to the selection, the Municipality cooperates with villagers and foresters, in order to understand their needs and requests and calculates demand for urban dwellers. Then the municipality organises a public auction to finally select and have a renting contract with the company that will manage forests designated for cutting and thinning.

Proportional equivalence between benefits and costs: This criteria is linked to pressures and impact in the DPSIR model, clearly contributing to the definition of the demand for ecosystem services. Referring to diagram no. 9, the benefits derived from a natural resource in the form of ecosystem services and the costs of managing the resource are a socio-economic impact how the governance and protection of the resource takes place. The impact has a direct implication on the articulation of the future demand for the services provided by the ecosystem, therefore leading to the cost-benefit equivalence acting as a driver for further use of the natural resources.

The Municipality/Ministry and external donors have been so far the key funding sources to the forest management system in Albania. The Government had a budget of app. 9 million EUR in 2014, which has gradually reduced to 5.8 million EUR in 2017. The balance between capital and current expenditures has also shifted from a balance in favour of capital expenditures in 2014 to current expenditures in 2017 as follows.

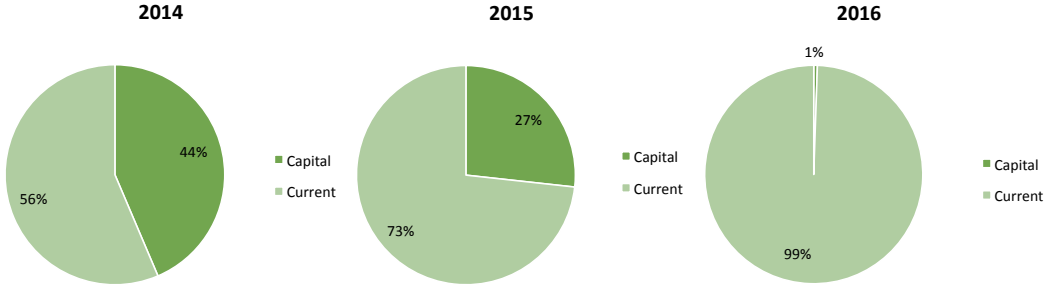
Figure 42. The balance between capital and current expenditures in state budget for forest management (EUR)



Source: www.financatvendore.al (2017) and own calculations, based on Ministry of Finance data

The situation with local funds is rather complex, due to the effect of the territorial-administrative reform implemented in 2015 (resulting with consolidation of 373 municipalities into 61), and the full transfer of forest management to local governments in 2016. As a result, the own funds capital expenditures have declined by around 80%, while the current expenditures have increased tremendously, because the functions' transfer was followed by the transfer of operational expenditures, such as salaries, etc. The state transfer for capital investments on the other hand has almost tripled in 2016, compared to 2014. Absolute figures remain though very low, with a total of app. 900,000 EUR own funds and app. 600,000 EUR state transfer for forests in 2016.

Figure 43. The balance between capital and current expenditures from local own funds



Source: www.financatvendore.al (2017) and own calculations, based on Ministry of Finance data

Donors have been/are interested in establishing a strong commons' regime and ecosystem based management system for forests, therefore supporting the governments, the users associations and foresters with related projects since 1995. World Bank projects alone rise to more than 30 million EUR. Local foresters that have a renting contract or agreement (usufructuary rights) with the municipality, or companies that have been granted licensed rights for a short-term period constitute another funding party. However, there is a disproportionate relation between costs and benefits that each party bears/receives.

Public institutions and donors invest in order to maintain the health of forests, ensure their sustainability and resilience of ecosystems and establish knowledge and capacities on how to govern forests through an integrated approach at the benefit of the direct forest user, the society and biodiversity. Due to their intended role and social responsibility, the governments and donors provide substantial funds, though the latter often do not match with the benefits they or the society is intended to receive. The users on the other hand, operate in a more individual and profit-based level, aiming at receiving the highest benefits at the lowest costs. While local users have a direct dependency relation with the forest ecosystem, therefore safeguarding them for the future, the licensed companies apply high discount rates to the ecosystem value. In many cases, the companies have not planted new trees after cutting timber as set in their contracts.

In the case of commonly managed forests, the villagers share among them responsibilities and the expected benefits proportionally to the size of the family and based on historical relations with the forest. This is all agreed in the renting contract, or the agreement they have with the Municipality. Furthermore, the aim is to generate surplus so that it covers

costs and provides minimum revenue for the villagers. Nevertheless, local foresters are keen on applying low discount rates as they see substantial future value in the forests. The major value they see is based on the cultural and cognitive services they subtract from the forest, rather than on provisioning rights.

The rules and criteria for allocating/licensing users rights to individuals, group of villagers or companies, together with fund allocation and disbursement are defined in the legislation and specified in contracts. These are nationally defined and tend to be as broad based as possible to reflect as many local circumstances as possible, but there is no typically any customization. The rules among villagers in the case of commonly managed forests are set between them informally and/or partially foreseen in the contract/agreement they have with the municipality. Those rules that do not appear in the contract are set and followed upon historical and practical knowledge that the shareholders have on the use of the forest at stake. Thus, both physical and temporal boundaries play a significant role in shaping the relation between the shareholders.

The overall management of forests from an institutional perspective is as follows: public in the case of municipalities governing the resource through their own enterprises; non-for-profit in the case of activities carried out by the users associations; profit making in the case of licensed companies; and profit making with low discount rate, social responsibility and cognitive value in the case of commonly managed forests.

Collective-choice arrangements: Decision-making on the use and management of forests is made based on the territorial plans and Forest Management Plans (FMP), prepared by the municipalities. The previous define the type of land use over the territory and designate possible areas for land use conversion. If the approved plan provides for conversion of forestland into other land uses, the Minister responsible on forests, or the Council of Ministers (area sensitive) issues the respective decision. The FMPs, on the other hand focuses on forests management. The current FMPs are old and their full update is rather costly. As a result, municipalities are faced with the concern of deciding how to proceed with forest management through renting contracts, in a situation where the plan is mandatory due to the moratorium conditions. So far, municipalities have managed forests through gradual and partial update of the plans, only for those parts of

the forestland that are rented out. The forest user/s participate in the update process by expressing his/their interest on the management of the forest, but do not affect decision-making. The municipality reflects these interests in the plan and monitors its implementation as part of the contractual agreement.

The representation of users' interests is regulated through the renting contract, if the latter exists, or simply by word of mouth. In the case of the latter, it is the municipality that guarantees users' interests and therefore it depends on the relationship between users and the municipality how the interests are addressed in the forest management plans.

The users' associations on the other hand, represent the community of local foresters mainly in the communication with the Municipality, the national forests federation and any policy process related to forests governance. The associations are registered in court with an NGO status. They exist since more than 20 years, but they pay the legally defined taxes only when receiving donor-funds to carry out activities as designated in their statutes. Because many of them have not unregistered during the financially silent periods, they experience troubles with the state institutions, or do not benefit from state funds, in case they wish to initiate activities with financial implications.

For instance, in response to the government's "Environmental Services" program of grants for the forest users associations, several associations have applied to receive funding that will be used to render maintenance services to the forests that are safeguarded by the rural people. In the case of the Municipality of Librazhd, none of the associations has had access to these funds so far, due to lack of full compliance with the selection criteria. Previous taxes and the representation of women with at least 50% are the key criteria that the associations have not fulfilled. In the case of Pogradec Municipality, the association of Golik Proptisht has earned funds for two forests in the range of 30-40 ha. The grants will be used to pay the villagers in undertaking a full cleaning of the two oak forests, which have not gone through this process for more than 10 years.

Since two years the national forests federation and the users associations have engaged in a critical lobbying and advocacy process to influence the new forests' law, to include communal property and all relational matters. The representatives of 251 users

associations and 11 regional forests federations have carried out 7 regional meetings, resulting on conclusions that the national forest federation presented to the Parliament, the Prime Minister and the President. They have raised issues such as: the process of property transfer to private owners is lagging behind; the management of forests in common by village-based users is not the most common form of forest governance and the current legislation does not promote it. Furthermore, in the few commons' cases, the users benefit defined by the use contract/agreement has a specific time limit and does not guarantee use exclusivity to the villagers. The latter can use forest products, but cannot sell them. The associations and the federation propose that local forests traditionally belonging to the villages should be given in use to the villages (rural families), which initially should have at least proprietary rights on an exclusive basis. This will guarantee full access, withdrawal, management and exclusion rights on forests, selling of forest timber and non-timber products and the intrinsic principle of historical users (FKPKK, 2016).

Internal common's users decision-making takes place through a usually unwritten agreement within the group that shares a forest. This is possible for the following reasons: i) in several cases the groups are small with 15 – 100 families, hence communication and cooperation among them is easier and carried out on a daily basis; ii) the traditional ownership criterion is very strong. Even in the cases of large groups (for instance Shushica in Elbasan has 400 families that share forests), there is good historical knowledge of the family clans[63] owning or having proprietary rights over forest before 1945. For cultural reasons, Albanians prefer to apply their user's rights within forest boundaries (physical ones) clearly delineated at family level. This gives a stronger sense of belonging and safety and it is thought to lower transaction costs. Hence, each time a new family is created the forest belonging to the base family is subdivided on proportional and equal basis for the new family to benefit.

However, the small group size and the continuous subdivision of the forest for use at family level contribute to an increasing system's fragmentation. Unlimited fragmentation decreases the efficiency of forest maintenance on a large scale because the maintenance varies between different plots within the natural boundaries. It has more or less the same effects as those of administrative boundaries on the forest functional and natural

boundaries. On the other hand, the young families may decide to move and live elsewhere, therefore being less able to participate in forest monitoring and maintenance activities.

The main aim of users associations is to avoid fragmentation, or its effects. They do so by continuously observing how forest users maintain and use the forest, providing counselling for the maintenance activities and providing information to the municipality in case a commonly governed forest is not being managed upon the agreement between the municipality and the users. But as the associations' work intensity is irregular over time and varies upon funding opportunities, so is the pressure they place on or incentives they provide to users.

Often, it all depends on the commitment of the head of the association, rather than on its proper institutional performance, therefore leading to an informal cooperation between the association and the users. There are also cases such as Griqan i Sipërm in Labinot Fushë (Elbasan), where the association has been dissolved and the rural families have established a direct interaction with the Municipality of Elbasan to establish a common forest management. It is clear that these associations can play a beneficial role in strengthening a commons' regime for forests, but their sustainability has to be guaranteed first. So far, the associations see funding opportunities as coming from donors and/or the government and do not pretend that users can also sustain their associations, assuming that users have yet weak rights on forests' governance and therefore low benefits that lead to lack of users' intention to invest money on the forest.

From a DPSIR perspective, collective choice arrangements have a good resonance with the Response factor. It is a response generated by different actors, for different purposes, therefore attacking all levels of the DPSIR, from driving forces to the impacts on the ecosystem.

Monitoring, graduated sanctions and conflict resolution: All these activities constitute responses taken by either the government/s, or the users to achieve sustainable governance of the forest natural resources. Some of these, especially when provided by law, such as the case of the environmental inspectorate monitoring or the sanctioning operate at a pressures level in the DPSIR diagram, but sanctioned legally on the highest

policy instrument – the law (GoA, 2005). Conflict resolution operates mostly at the state and impact levels, as this is when the problem or conflict becomes apparent.

The forest owners, the users of shared resources and the municipal and national inspectors carry out forests' monitoring (GoA, 2005). Forest owners and users do not apply any sanction in case of own property violation, rather than warn the violator. However, they report the case to the municipality to ensure that there will be no repeated violation. Sometimes they fence the property in order to avoid violation. However, this is not so common as private forest ownership is traditionally recognised in the village, the cases of violation are rare if not existent at all in private property, and the size of the forest is large for a family to fence it.

In the case of commonly shared forests, the system functions similarly to the privately owned forests. The users monitor their share of forest, but are also vigilant to observe what happens around their neighbours' shares. The fact of not being able to sell forests products, but only use for themselves becomes an incentive for them to protect what they are allowed to benefit. Most of the violation happens from people who leave in the nearby villages and have no forests in common, simply for geographical location reasons. For those who have a smaller forest share (1.5 – 10 ha), forest monitoring is a rather simple task. However, there are cases where one family is responsible for managing a forest area as large as 120 ha (Shelcë in Elbasan). In such cases, the family cannot monitor the whole forest daily; hence cases of violation from nearby villages are a more common concern.

As the property of the commonly shared forests belongs to the municipality, the latter applies violation penalties as defined in the legislation. The system of penalties is that of a "graduated sanctions". Still, since the moratorium is in place the inspectors apply a fixed-penalty of app. 45,000 EUR for each violation (GoA, 2016/b). The inspectors are aware that local users would never be able to pay such penalties, so they informally apply the 'graduated sanctioning' system, with warning as the initial step in case of noticing a violation.

In case of conflicts, resolution follows a step-by-step approach. Initially individuals involved in conflict try to solve the conflict amicably among them. If no solution is found,

then the village alderman and/or the representative of the users' association intermediates between the conflicting parties. In other cases, all members get together and try to reach a solution. If the conflict remains still unsolved, then the parties ask the municipality as an intermediate. Las but not least, there are also cases of two litigants only, where no solution is found and the conflict remains unresolved overtime.

Recognition of the forest regime and nested enterprises: From a DPSIR perspective, the recognition of the CPR forest regime by law and the existence of nested enterprises are a typical response at the level of the driving forces. By undertaking policies that impact the whole forest governance system, it is possible to attack forest use problems at the very level of the demand generation.

To date, the forest governance system allows for common management of forests to take place, but is vague in terms of legal provisions that regulate a commons' regime. It is a typical situation of 'the law does not prohibit it so you can do it' rather than a situation of 'the law regulates it hence you should do it'. The local users' associations and the forest federations (national and regional) advocate on behalf of the local appropriators, insisting that the law should include common property on forests and property belonging to the village, as recognised traditionally. Current internal rules in the case of commons do not appear in the legislation, but this can be subject to bylaws, once the commons' regime and property will be recognised by law.

The juridical status of the forest considered for use as CPR is municipal property given in use to local appropriators through the use agreement. The users can benefit of this property, but in absence of a clear legal relationship with the property and the municipality, their interest is safeguarded only by the good will and positive common sense of the municipal officials. In these circumstances, the forest users association play an extremely important role by acting as a "cross-scale linkage … crucial for the provision of services … related to the protection and enhancement of community forests, the economic development of community enterprises, and the political representation of the communities" (Garcia-Lopez, 2013, p.406).

According to the National Forests Federation there are 50 users associations in the Shkumbini river basin (middle and upper basin). The users' associations that act on

behalf of the local appropriators have an NGO status and have no user rights. They advocate and lobby on behalf of the users and when accessing funds, they also support users to organise and maintain the health of the forest. These associations are the ones to implement ES restoration and protection practices, though due to finances and limited knowledge, so far with a limited contribution. Though the associations are not very effective to date also due to lack of financial sustainability, they constitute the hook for pulling a proper system of forest commons, by having the ability to penetrate locally next to organising a polycentric network of forest governance. Hence, the associations contribute functioning, though yet weak, cross-scale arrangements for sustainable governance, by establishing a layer in the multi-tiers system of governance (Antinori & Garcia-Lopez, 2008), which is able to mediate the bottom-up and top-down approaches and actors. The associations have the opportunity to directly benefit from national resources for forest ES restoration and protection, therefore being the implementers of non-institutional means for ecosystem based governance of forests. In conclusion, to date the association paly a role in guaranteeing the following benefits "resources for forestry programs; resources for basic infrastructure; information; political representation; unity; forestry services" (Garcia-Lopez, 2013, p.415). Their position is vital to establishing a national system of commons and can serve to sustaining the management of large commons on ecosystem principles.

4.3.2 Albanian forests ecosystem governance from a commons' theory perspective – SESMAD variables for large scales

Besides the 8 design principles for robust CPR institutions, a discussion of the selected SESMAD variables is also made for the Shkumbini basin. These SESMAD variables were explained in section 3.5 and are provided in Annex no. 3 for greater details and understanding. The following text explores each variable, making reference to Shkumbini basin and the governance of forests in Albania.

Component type[64]: Actor

Dependence on the resource: This is a typical pressure variable as far as DPSIR is concerned, as according to Ostrom (1990) the resource users are dependent on the resource for a portion of their livelihood. In the cascade model, the dependence on the

resources is strongly linked to the provisioning ecosystem services that users derive from the forest. The SESMAD methodology (See Annex no. 3) defines already the importance of this variable, highlighting the fact that collective action is facilitated when resource users sustain most of their livelihood through the resource (SESMAD, 2014/a). In all of the cases explored within the basin's area, the users have a moderate livelihood dependency on the forests they take care of. As a matter of fact the strongest ties with forests are created in those cases and villages, where the historical memory of forest ownership (mostly proprietary and in few cases also alienation) is still vivid. The users show high interest in protecting the forests because 80 years ago, the forest belonged to his/her family. The family had either bought the forest, or had users' rights based on the historical governance regimes. Property restitution after 1990 was and still remains an unresolved issue nation wide. People consider it as yet an 'open wound' and any instrument that brings them closer to their property is welcomed, even if it is not a final and legal solution. Therefore, all commoners reported that their sense of pride has increased since they manage their forests and their own cognitive development, spiritual and recreational values constitute key factors of why they are glad and willing to manage the forests.

Of course commoners withdraw also primary and secondary products from the forests they manage and protect. These are mostly: tree branches and leaves from the cleaning process, and medicinal herbs and mushrooms. They also hunt rabbits and wild boars, especially when the number of boars is large and they attack houses and private agriculture gardens. In almost no cases the forest is used as a pasture area for sheep because, it is mostly oak forests and there are no pastures within. The withdrawal of these services is definitely a benefit to the households, but it is not their primary mean of securing livelihood. Almost all villagers either sustain their lives through agriculture and animal farming, or have also a second job in the administration. Forestry is not their major life-sustaining mean also because they cannot sell forest timber products. Therefore, the commoners take care of the forest by investing in kind (their work) and withdrawing few products for family use.

(Actor) Group size: As SESMAD (2014/a) argues based on different authors, on the importance of this variable, the smaller groups are more likely to resolve the collective

action problems. However, several other authors argue that the larger the group size, the more able it is to guarantee financial means and instruments for sustainable forest CPRs (SESMAD, 2014/a); (Agrawal, 2000). In the case of Shkumbini river basin, the groups size varies from one watershed to the other. There are cases of 15 families (Kyçyk in Tregan, Elbasan), 30 families in Golik (Proptisht, Pogradec), 100 families in Griqan i Sipërm (Labinot Fushë, Elbasan), or around 400 families in Shelcan (Elbasan).

The level of collective action in all cases is similar and it is not so much dependent on the group size rather than on the forest size each family manages. This is so, because the group is not organised to render services to the forest in common. Thus, the common forest is subdivided into management units, one per each family, based on the historical ownership criterion. Then, each family protects and maintains its share. The monitoring is also an individual responsibility, but each family monitors all forest areas it can and notifies the responsible family of any observed violation, or intervenes in blocking an occurring violation. Anytime a family has to carry out forest cleaning activities, it may invite other families to help based on a minimal payment. Several families avoid requesting other families for support, due to not being able of offering a financial compensation. In these circumstances, the larger is the forest share that a family manages, the higher are the benefits, but the more difficult and costly is to monitor it, protect it and clean it.

From a DPSIR perspective, the group size variable resonates well with the response given at impact level. However, the size of the forest share a family manages correlates with pressure indicators. As such, it should be used when mapping demand for ecosystem services.

(Common) Political power and civil society: Regardless of the continuous efforts made at different levels, the political power of the commons' actors remains still low. The national government holds the power of revising policies and legislation and municipalities have the implementation power. As it was described in chapter 4.1, segments of the civil society composed of the National Forest Federation, its regional branches, the forest users' associations and a group of forestry experts and professionals are striving since 2014 in impacting the amendment of the forest law, aiming at

promoting a commons governance system. The stakeholders' negotiation process was rather intensive for 2 years, till the national elections took place in June 2017. Since elections, the government is going through a long, slow and deep restructuring process, where the priority over forests legislation is not a key issue in the political agenda. On the other hand, civil society at large is not aware of the forests conditions, the forest policies that favour small individuals or groups, and of the need to promote a commons' governance system as the means to guarantee the sustainability of forests and lower effects of climate change. Environmental awareness is generally low among the population and therefore their power to impact policy-making in favour of sustainable forest management is also very limited.

The changes that have occurred to the legislation, the subsequent amendments and the efforts to bring in place a new law (for the 3rd time) without any conclusion and decision, are a good example of what Gryzmala-Busse and Luong (2002, pg. 546) call "a personalistic state-building process" where "elite competition is both informal and self-contained", rather than formal and representative. Because the distinction between state and society, in a context of heavy centralised and closed economy was not clear to the population, representation was a hardly perceived concept after the radical socio-economic transformation of early '90s. Democratic movements of the early `90s were dealing with a uniformed population and with the presence of a hidden personal and informal network of power. This network was supporting and benefiting from the previous regime and government and it quickly gained space after the socio-political transformation, affecting the process of 'new elites formation and competition' (Gryzmala-Busse & Luong, 2002). In these circumstances, the population was striving to adapt to the change and understand the new societal rights and duties, hence loosing time in establishing a strong model of democratic society's representation, beyond merely restructuring of the government. This process has resulted to date into a weak civil society and therefore weak multi-tiers governance. The government structures still hold the power of shaping the society's norms and behaviour, without proper reference to and collaboration with the affected stakeholders.

From a DPSIR perspective the political power and the civil society variable can be regarded on both sides: the pressure and the response to driving forces. The continuous

review of the legislation and the power to impact the process stands on the pressure side. However the ability of the civil society and commons' actors to impact the legislation in favour of the commons' governance is a response towards policy failures, by enabling multi-tiers polycentric governance.

(Actor) Scientific knowledge: The field reports show that the users have a relatively good knowledge of their forests in terms of how to clean, maintain and extract primary and secondary products. This is however based on traditional know-how passed from one generation to the other. Hence, in overall the users' scientific knowledge is low and mainly intuitive, based on family knowledge transfer. This may set a pressure on the resource, even though the users are willing to protect the resource for the long-term, because the ecosystem-based governance happens ad-hoc and based on inherited know-how. The knowledge of the official forest experts at local and national level, on the other hand, is above average, but cannot be considered as typical pluralistic one. Municipal forest officials have mostly a one-resource management perspective and are less aware of the diversity of interrelations between ecosystems and ecosystem elements and human needs. They consider the forest as a vital natural system and a common resource, but do not consider forest ecosystem services as commons, and therefore as Kluvankova *et al.* (2015) pg. 26 argue, forest ecosystem services face the "traditional social dilemma of individual and collective interests", which resonates beyond the forest boundaries. A high scientifically based knowledge would affect the impact that users and other actors' pressures set on forests. Still, the incorporation of scientific information and evidence-based decisions in policymaking is far from the horizon.

Actor adaptive capacity: This variable shapes the response to pressures, state and impacts on the environment. The group of commoners can be described as of high adaptive capacity and this finding is withdrawn not only from the interviews and fieldwork, but also from a careful look into the historical development of forest governance (for details see chapter 4.1). While commons were fully suppressed for 50 years, the knowledge on forest commons and the inherent link between users and forests (as property and as a natural resource) remained almost intact. The practice on organising as a group around commons has weakened though. Still the commoners have found new

ways to approach forest commons governance, by subdividing the common forest into family shares and carrying out together the monitoring of the forests.

The adaptive capacity is high also due to the diversity of income, which is not based merely on forest user rights. As a matter of fact, the spiritual and cognitive development value that users gain is higher than the provisioning value. Regulatory values are considered much less – as an indispensable mean to guarantee forest survival and therefore spiritual and cognitive development services. As the dependence on the resource is law and the cognitive development value is high, consequently the actors' adaptive capacity is high.

Actor traditional knowledge: This variable is rated as high. As mentioned above common forest governance has survived at least 50 years of suppression and after that period, for the last 27 years has been making its way through a rather hostile legal framework. As described in detail in chapter 4.2, the legal frame does not impede the commons' governance, but it does also not regulate it and it does not provide incentive for its development. When actor traditional knowledge is low, it shapes the pressures that commoners put on the resource. On the other hand, if it is high, it affects the response to pressures, state and impact. The latter is the case of commoners in the Shkumbini river basin. Traditional knowledge flows within family generations, from parents to children. Contrary to the missing scientific knowledge, this intuitive and historical know-how is present. The latter is what guides commoners towards sustainable forest management measures and achievement of resilience objectives, in absence of scientific knowledge on the concept.

Commoners know the proper ways of carrying out cleaning, pruning and trimming of the forest. They can identify the different diseases when present and ask the municipal officials for treatment support. Many of them raise and keep honeybees, not simply as an economic and life sustenance alternative, but also for the well-known pollination benefit. They also often communicate with the head of the users association (who in most of the cases is a forest engineer) to get extra advice and strengthen traditional knowledge on the forest.

Ecosystem services management: The importance of forest management from an ecosystem services perspective was largely discussed in chapters 2.2 and 3. This integrated management approach ensures the long-term sustainability of the resource (SESMAD, 2014/a) and it shapes the governance response to all other components in a DPSIR analysis, such as drivers, pressures, state and impact on the environment. It is implemented when the understanding of benefits from ecosystem services and values of these benefits (in the cascade model) is complete for all ecosystem services, namely provisioning, regulating and cultural. In the case of Shkumbini river basin, as the scientific knowledge of the commoners is low and that of the experts is rated as above average, ecosystem services management is not a mainstream approach. It happens mainly on a intuitive basis, and not based on broadly agreed policy decision-making and complete forest management planning.

Furthermore, as scientific knowledge is incomplete, most of the ecosystem services management that commoners carry out concerns the cultural services, based on spiritual, pride and cognitive development values. However, there is no policy articulation of the latter. It is possible to understand that cultural values prevail over provisioning and regulating ones, by asking commoners on why do they take care of the forest in a context of very limited proper financial resources and benefits.

During the last three years, the Government of Albania (Ministry of Environment) is implementing the Environmental Services Project (WB ESP, 2017) with the support of World Bank (IBRD and GEF as described in section 4.2.1) that aims to build ecosystem services management practices on a local level. This is done through a granting system for forest maintenance as well as through the promotion of a program on Payments for Ecosystem Services. The project has a target of 10 such initiatives, but to date none has been implemented.

Economic heterogeneity: This variable acts as a driving force by being linked to livelihood sustenance, income and other economic endowments (SESMAD, 2014/a). The poverty headcount in both of the qarks (Elbasan and Korça) where forests are located stands significantly below the average of Albania for 2012 (14.3%) (Shutina et al., 2016). The gross national disposable income on the other hand stands below the national

average for 2014 by around 25% for both these Qarks (Shutina et al., 2016). This is an indicator used to assess consumer behaviour and available resources that together with poverty indicators provide quick information on the level of economic heterogeneity within a region. So, in terms of the poverty indicator of inequality, Gini coefficient is lower than 30% in all of the qarks that fall within the Shkumbini river basin boundaries (Shutina et al., 2016), classifying therefore the region as of low economic heterogeneity (SESMAD, 2014/a).

However, Shutina *et al.* (2016) argue (based on INSTAT data and field work) that while the inequalities are low at qark and regional level, they increase significantly at local level. Major and significant disparities are present between the rural and urban population within the territory of the municipalities. Thus, economic heterogeneity is low within the rural area and the disparities are present when compared to the urban area.

Leadership: Leadership is highly important in a commons system as it provides and facilitates the provision of the public goods needed to organise the commoners (SESMAD, 2014/a). In the case of Shkumbini river basin, leadership for forest commons is missing. This reflects the typology of forest commons governance, where the commoners manage their individual shares of the common forest and do not share activities. As mentioned earlier, monitoring of the forest is the only activity where all users engage jointly, i.e. everyone monitors each and every forest share. As monitoring takes place simply through walking the forest or around it, this is considered as no or very low cost activity. As a result, all commoners find it easy and inexpensive to engage in monitoring, without feeling a need for someone to organise them around this activity. Beyond monitoring, the few cases where commoners get together to discuss forest commons are those in which the head of the users association of the municipal officials organise forest commons' events.

While commoners do not organise themselves as a group (there is no leadership within the group), they willingly accept to participate to activities organised by the head of the users association of the municipality, as long as these do not generate costs, or at least produce benefits. For instance, in Shelcë village, the commoners reported that they had not met as a group since a very long time and the focus group (organised by the

municipality for the sake of this research) was the first meeting on forest commons they were attending since at least 2 years. They often felt the need to discuss their problems related to forest shares management, but none of them ever took the initiative to organise the group. In few other villages, the commoners reported that they meet rarely to discuss their issues related to forest management and do so when the alderman organises them. The latter is not a typical leader; he is rather a facilitator of communication on forest management among commoners. Officially, the heads of the users associations would also be considered mainly as facilitators and intermediaries between commoners and the municipality, rather than leaders. Anytime an opportunity would arise to access funds for forest maintenance in a given area, the head of the association (accessing those funds), would make sure that the members were the first to benefit.

In conclusion, referring to Armitage (2008), a collective bottom-up vision on forest commons, and a promoter's role for polycentric governance of the commons is missing in the basin. The existence of the users associations, on the other hand, provides a good basis for the facilitator's role, and it also provides a network where an effective multi-tiers and polycentric governance model could be rooted. The latter would probably also stimulate commoners into engaging into further commons activities, which would then fuel a need for the leader's role. The existence of leadership would also articulate a proper response to driving forces in forest exploitation, through strengthening the local (bottom-up) influence in forest governance, and hence the embarking on a multi-tiers and polycentric governance system.

Leadership authority: Equally to leadership, this variable acts also as a response to drivers in forest exploitation. In the Shkumbini basin is hard to talk about leadership authority, once the leadership is not present in a commoners group. The commoners group is typically a decentralised one, where a traditional and historically known set of rules is passed down through generations in each family, is known among villagers, and is therefore prevailing in the overall set-up of forest commons governance. The heads of users associations – though not leaders and formally facilitators/intermediaries, have a medium level authority. This happens for two reasons: the municipality values highly the heads of forest users associations for their information, facilitator's and intermediary role, but does not grant them with any authority on forest management; the heads of forest

users associations have no incentives to decide assuming the costs of collective action or enterprises – they simply have the good will to take positive action on behalf of the forests in their sub-watershed and will act on behalf of the members of the association as long as they are willing to carry out joint activities.

Livelihood alternatives: Livelihood alternatives constitute typical driving forces in terms of how stakeholders, especially users, behave towards forests. The forest users of the Shkumbini river basin have a low dependency on forests (already argued in the beginning of this chapter) and the major reason behind is that forestry does not constitute their major livelihood alternative. According the fieldwork they mostly base their life sustenance on agriculture and pastoralism, trade and services, remittances, and to a lesser degree on administrative works and construction. To date there are not data on the shares that different economic sectors have on employment. The Institute of Statistics provides information though on the no. of active enterprises by economic sector. Agriculture, forestry and fishing constitute 1.7% of the active enterprises in Albania and in Elbasan and Korçë (the qarks where forests are located) this sector has a share of 1.4% and 2.1% respectively. These two qarks have the lowest shares of agriculture/ forestry/ fishing active enterprises, after Tirana with 0.4%. Trade, services and industry have in both qarks the highest shares of active enterprises.

SESMAD (2014/a) argues that the lower dependency on forest resources increases the resilience of the users' group, but decreases their likeliness of conserving the common forests. Still, it was argued earlier that in the case of the Shkumbini basin, cultural and cognitive development ecosystem services are the major driving force (ecosystem wise) in shaping the interest on commons. As a result, the highest resilience of the commoners' group, its high adaptive capacity and low dependence on the resource (due also to diversity of lively hood alternatives) is a factor that supports the users in their effort to take care of common forests.

Property regime: Property regimes define the type of property relations that exist among users and other stakeholders and the resources. These relations are often described as use rights and include also the power of the institutions to affect, modify and enforce these rights. In this sense, the property regime is a typical driving force in shaping the general

behaviour of governance and exploitation of forests. In the case of forest commons, the property regime is officially twofold: i) forests mostly as public property owned by the municipality and the government (see chapter 4.1); and ii) forests as private property – as already explained in chapter 4.1 only 3% of the Albanian forests are held in private. Common property does not exist, while the common governance of publicly owned forests is not explicitly defined in the forestry legislation. There are legal provisions that allow for common forest governance to take place, but there are no provisions that promote it, incentivise it or regulate it. Furthermore, the law defines and regulated the licensed-rights regime, which is a licensing of certain users' rights to selected companies for timber exploitation and trade.

In practical terms and in absence of legal regulations, the common management of certain forests (those located close to villages) functions based on historical and traditional practices and rules (proximity principle and historical traditions principle). The local forest officials support it because: they are aware of the benefits on forest of using this governance system and therefore are willing to support it; the municipalities have no sufficient financial and human capacities to manage large territories of forests and therefore find it very useful to rely on the local population's support for at least a portion of the municipal forests (around 30% on a basins' level – see chapter 4.1 and section 4.3.1).

Property security: This variable is also a typical driving force and it is strongly related to the type of property regime, its overall design and performance. Given the above argument on property regime, the property rights security of commoners is very low – no legal regulation and based on good will of local officials, word of mouth, historical know-how and traditional codes of conduct. Furthermore, property security in general is not rated as high in Albania. The phenomenon of informal developments taking place since early 1990 on agriculture and forestland, the continuing informal exploitation of natural resources (Toto, 2015), the lagging behind process of land restitution and conflicts over land property (Toto et al., 2011) constitute a significant testimonial of the low security of the property in overall, where forest property makes no exception.

Cultural heterogeneity: Cultural heterogeneity affects driving forces and, in particular, the livelihood sustenance by impacting the actors' economic heterogeneity, actors' adaptability and resilience and finally the dependence on the resource. As such it is a demand factor. In the case of Shkumbini river basin, cultural heterogeneity is low within commons' groups of users, or within sub-watersheds and it is at a medium level within the basin.

There are no data that show typical cultural heterogeneity indicators, therefore the context can be analysed through secondary information and deductive reasoning. For instance, Korçë and Elbasan have an age dependency ratio of 46.5%, which is amongst the highest in Albania and standing above the national average of 45.2% (Shutina et al., 2016). This means that the total of the young population (below 15 years of age) and of the older population (above 65 years of age) is significantly high, compared to the working age population, having a high dependency on the latter. It also shows that emigration has prevailed in the last 20 years. In fact, looking at population change dynamics, both qarks had a decreasing rate of population during 2001-2014, which is at the levels of -15% to -18% (Shutina et al., 2016), showing for a prevailing factor of emigration rather than immigration in the region. Hence, not so many changes have happened to the population structure in the region, and at village level the homogeneity from a traditional, historical and cultural perspective is quite high. On a basins level though, cultural homogeneity is moderate and so is cultural heterogeneity, due to especially the population movement and induced cultural heterogeneity.

Technology role: This variable is a driver in the DPSIR diagram as it affects how forest use takes place and the purpose for managing and/or exploiting forests. The level of technology used to manage common forests is not so evident in the Shkumbini river, but analysis undertaken on a national scale shows that low technologies are being used so far and this is an obstacle factor to the sustainable development of forests (GoA, 2016/c). Currently, the government is aiming at technological improvement in forest exploitation and doubling of wood combustion efficiency as a means to achieve a forestation rate of 500-1,000ha per year and therefore accomplish climate change targets for Albania (GoA, 2016/c); (Toto, 2017).

User group external support: Chapters 3 and 4.1 discuss in detail the concept of community forest management (theoretically and in the case of Albania/Shkumbini river basin), highlighting its importance in the frame of the enabled polycentric and multi-tiers governance. Depending on the governance model and the level of democracy, other actors intervene in the community forest management aiming to restrain it, or increase the livelihood of the communities. In this respect, external support to forest users implies these interventions and, in a DPSIR analysis, it affects the response directed mainly to pressures and state. The support is provided to commoners. Because the support impacts also the level of awareness on forests, it may also act as a driving force.

Chapter 4.1 describes in great detail the type of support that forest users have received in the last 25 years, to mention the WB projects on common forests, the USAID project on private and common forests, the current government project on environmental services etc. The government forest extension service is another means of providing external support to forest users, though as analysed earlier it has been weak and lacking efficiency. Further, the major external support is being currently provided to forest users by municipalities, the forest users associations and the forest federation (national and regional branches). In conclusion, user group external support has always been present in Albania's and Shkumbini basin forests and it has been probably the major factor in shaping forest commons in the absence of proper legal arrangements. The support has been provided in the form of capacity building, grants and subsidies, processes' management and scientific information.

User-commons proximity: In all of the cases identified as commons' user groups in the Shkumbini river basin, the users are located close to the resource. This is more than just an important fact, it is a precondition for the following: i) a forest is considered as common in those cases, where it is located close to the village. This has historically been the case and this is how, even after years of private and common property suppression, the families and their generations remember a forest as belonging to an individual, a family or a group of households in a village; ii) in a highly decentralised system of forest commons management (as currently is in the basin), forest monitoring is the only joint activity to take place. The transaction and direct costs of such an activity are diminished, or avoided through the proximity of the resource to the house of each user. Those cases

where forest violation is present, are those where either the forest is far from the rural settlement, or the forest area is very large, making it difficult for the users to monitor it accurately. The proximity factor affects the level of pressures that users place on a forest, but also the response (sustainable management) when a system of commons exists and it is robust.

User group well-being change: The overall well-being change of the forest users is driving force factor, hence shaping the demand for forest ecosystem services. This is linked to the livelihood sustenance means, urbanization patterns – the presence of urban forest owners, the decreasing rural population – people who leave the rural area, and other direct or indirect economic factors on a macro-scale.

All qarks in the Shkumbini river basin have a pattern of decreasing population, affected by net migration (negative) and less natural population increase (positive but very low) (Shutina et al., 2016). The population movement happens in a cascade fashion – people from the rural areas move towards the qark centres and residents in the qark centres move towards the Tirana-Durrës region, or emigrate abroad (INSTAT, 2014/a) (INSTAT, 2014/b). The depopulation of the rural areas leads to a decreased number of common forest users and therefore a weaker bottom-up community governance of forests.

From the well-being perspective, poverty has in overall decreased in the last 2 decades, but disparities (urban-rural) have increased (Shutina et al., 2016). In a context where a specific social-economic assessment of the households in the basin has not taken place, it is hard to draw clear conclusions on the user group well-being change. However, it may be generalised that the trend has remained almost constant, showing for minor improvements.

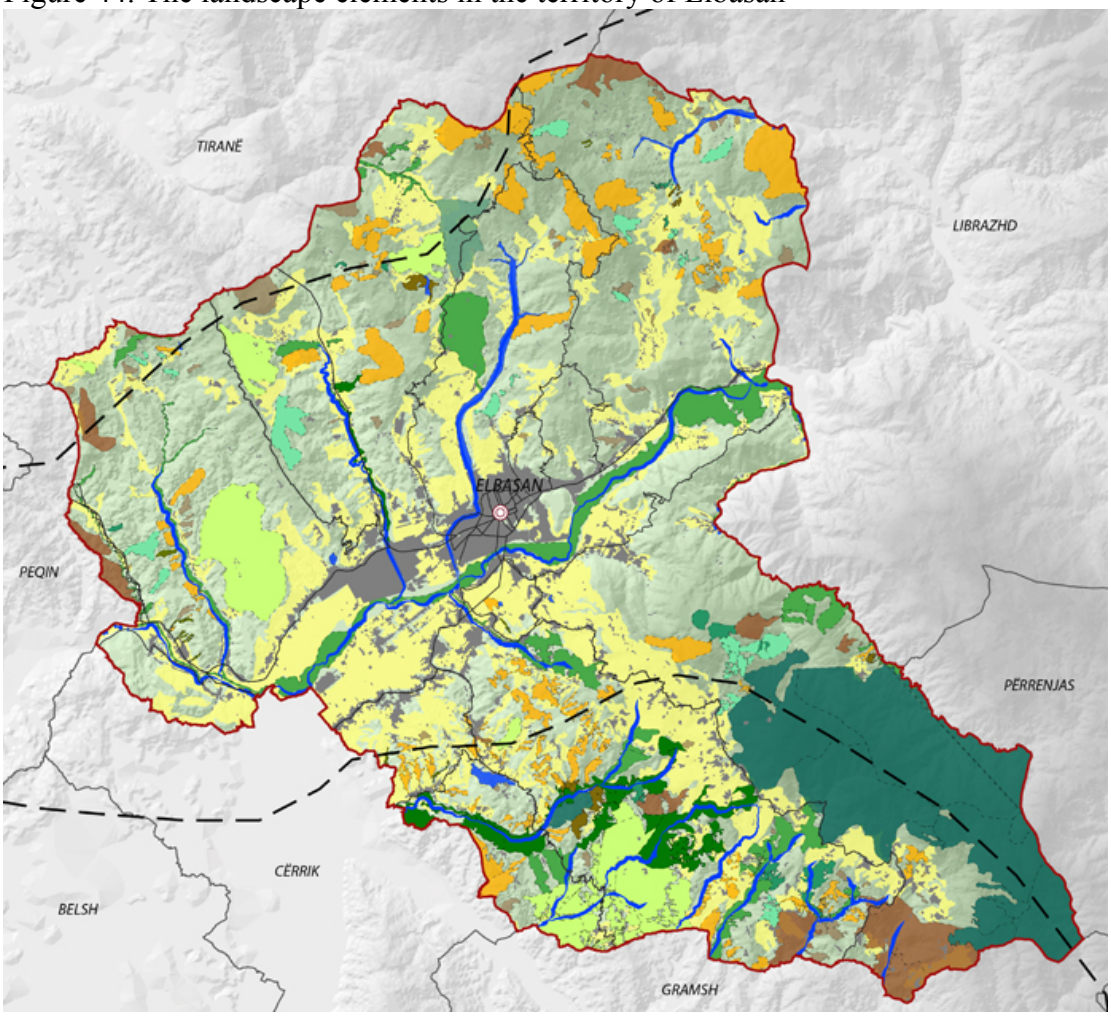
Still, the lack of overall change in the users group well-being has not affected the cultural, spiritual and cognitive development value that the users receive/expect from the forests. This has pushed them towards taking better care for their forests' shares and hence has increased the type and quantity of provisioning services that they may harvest from forests. Thus, on a micro and family level, forest commons have had a positive impact on the users' well-being.

Component type: Environmental Common

Resource characteristics: The resource subject to the research is the 'forests in the Shkumbini River basin'. Most of the commonly managed forests are oak and to a lesser degree also ash that are located on suitable altitudes (above sea level) in terms of proximity to villages and rural households. Details on the resource characterization are already provided in the section 4.2.1. From a DPSIR perspective, resource characterisation falls under the state of the environment, and it is linked to the biophysical structure and processes in the cascade model. Resource characterisation provides information on the supply side of the ecosystem.

Commons heterogeneity: Forest resources with low heterogeneity are those that do not display a pattern of uneven and fragmented distribution across the space. In this case the resources is continuously distributed and undisturbed (SESMAD, 2014/a). The land use maps presented in section 4.2.3 show that spatial heterogeneity and fragmentation of forest landscapes is high in the Elbasan municipality area and is significantly lower in Librazhd, Prrenjas and Mokër in Pogradec. The latter three have a less and smaller urban areas and also lower population and economic and industrial activities. As a result the human-environment interaction produces fewer negative effects than in Elbasan. To demonstrate visually the patchiness of the forest landscapes, reference is made to the following map of landscape elements in the Municipality of Elbasan.

Figure 44. The landscape elements in the territory of Elbasan



Source: Co-PLAN, 2015 and own graphical improvements

Furthermore, the respondents of Elbasan reported forest areas/shares of 1.5 – 10ha, the closer they and the forest were located to the urban and industrial sites. The farther the forest was from the urban area (the city), the bigger was its size. Forest heterogeneity and

fragmentation is a pressure on the resource placed exercised mainly by other economic interests, such as tourism development and recreational activities. It represents also state of the environment, by indicating the level of intervention and/or protection that users and other actors implement in relation to forest commons.

Commons spatial extent: The spatial extent of forests varies from one location to the other (see section 4.3.1) and it is linked to the level of landscape matrix fragmentation on the territory. Common forests have a higher fragmentation level compared to non-common forests. As discussed above the common forests are located close to households and villages (so as to classify as commons) so their patchiness depends on the organisation of the rural settlements and use of land. Thus, silvo-pastoralism is more prominent as a pressure in the common forests than in the non-common ones. Land conversion is another pressure exercised on common forests, hence contributing to further fragmentation and reduction of spatial extent.

Still, the commoners report that they are trying to move away from unsustainable practices of forest use and protect their forests, so as to avoid (among others) also fragmentation. There cases (such as in Elbasan – Papër), where commoners have helped in reforestation of the areas that were deforested before 1990 for developing orchards and agriculture use.

In the case of the 'higher' forests, which are mainly pine, beech and firs, the municipality has the governance responsibility and has not 'delegated' management to commoners. These forests are far from the villages and located in higher altitudes above sea level (see section 4.2.2). There is no risk of fragmentation from activities such as those described in the above paragraphs, but there is a high risk of informal forest exploitation as monitoring happens rarely in these terrains of difficult access.

Provision services conditions: The state of the provision services in forest commons is currently in a path of slow but steady improvement. Forest commons have gone through a controversial process since the `60s, when the centralised government of Albania initiated the implementation of a deforestation reform for the sake of creation of agriculture land on hilly and soft mountainous terrains – more precisely there where the common forests were located. Since then, the major impact was the significant reduction of forestland

(see chapter 4.1) and the loss of provisioning and regulating services. Cultural functions were lost as well, but at that period those forests were not valued much from a cultural and cognitive development perspective, hence these functions could not be articulated as services. The forestland was mainly substituted for orchards and vineyards, and to a lesser degree also crops.

Soon after 1990, in all of the villages a movement of agriculture land abandonment and forest and orchard clearing was initiated. The abandonment of land was mainly the result of the internal migratory movements from remote rural areas to the urban ones, as well as emigration abroad – features of changing alternatives for livelihood sustenance. Initial common forests clearing on the other hand, lasted around two years and it resulted into significant reduction of existing forestland and elimination of orchards on hilly terrains. During fieldwork, all villagers and forest users reported that this 'common heresy' of forest/orchard clearing was the effect of the societal aspiration for eliminating in full the legacy of the previous centralised socialist regime. They thought that by wiping out state forests, orchards and socialist properties – hence unmaking socialist property, they would eliminate any single possibility for the "socialist regime to recover and assert control over agriculture and forestry once again" (Sikor et al., 2009, p.179). The government and the people considered 'making property' as a pillar of the state-reformation process (Sikor et al., 2009) after the change of the socio-political and economic regime, and this is why the property reform was one of the first reforms to initiate in 1991.

Common forests' destruction by villagers did not last long. After the first wave of anger and unconscious behaviour, the local people gained memory of the past (prior to 1945), of traditions and customary arrangements and conducts. They turned to common forests with a new approach – that of protecting and maintaining forests, as well as contributing to the forestation processes. This has increased the quality and quantity of provisioning services from common forests. Still the commoners are vary cautious in harvesting primary and secondary products from the forests they maintain and value the most the cultural and cognitive development services that they receive.

However, forest clearing did not sop. It was merely displaced to non-common forests, in the higher slopes and elevations above the sea level. Both, the villagers – for having open

access to public forests, and the licensed-rights companies – exporting timber and selling wood for commercial benefits, engaged in forest clearing. This activity is still going on, though the government (as described in chapter 4.2) claims that timber export has decreased since the forest moratorium is in place and wood import has increased.

Regulating services conditions: The elimination of orchards on hilly terrains where forests previously lied and forest cutting in the first two years after the shift of the socio-political and economic regime (1990) as described above, led among others to the increase of the erosive area in mountainous and hilly terrains, as well as along the rivers. The erosion phenomenon is the major and most visible factor of impact of worsening conditions of regulating services for common forests in the first clearing phase. To date, due to increased care on common forests (as argued in the provisioning services variable), regulating services have also improved significantly at the scale of each common forest. However, the second phase of forest clearing (in the high forests) has contributed to an overall increase of erosion on a basin scale.

Cultural services conditions: The situation with the cultural services conditions is similar to the regulating and provisioning services. It is worth mentioning once again that on a small, local and common forest scale, the state of the ecosystem services has increased to very satisfactory levels. On the other hand, on a basin scale, the total quality of forest ES has deteriorated, due to care of maintenance and forest abuse and overexploitation in the non-common forests. The latter, as shown in chapter 4.2, constitute around 60% of forests in the basin.

Component type: Governance System

Governance system effect: The governance system may act both as a driver and a response at driver and pressure level in the DPSIR analysis. It is a driver in terms of guiding the behaviour of users towards forest commons and it is a response, when action is taken to improve the governance system, so as to meet the social and ecological goals. In the Shkumbini river basin, the effect of the governance system in terms of meeting its targets could be analysed from a twofold perspective. The CPR governance system on forest commons meets its goals, both from a social and ecological perspective, but

through a very intuitive system – it does not follow a logic of goals, objectives, activities and results; it is based on customary traditional arrangements. On the other hand, the formal governance system (forests are by law a municipal property) hardly meets its goals. The discussion on the conditions of the forest ecosystem services in the above variables is an indicator for how at a basin level, the overall conditions are worsening rather than improving.

Centralization: Centralization of the governance is linked to the type of the governance system and therefore acts both as a driver and response at driver and pressure level, in a DPSIR analysis. Again the discussion has two faces of the same coin: the formal governance system is somewhat decentralised. Most of the forests at the national and basin scale belong to the municipalities (since 2 years) and the latter have the legal obligation and responsibility of managing forests in a sustainable way. Forest commons, on the other hand, are managed through a rather informal and highly decentralised system. As it was argued earlier in the text, each family has a proportional share of the common forest and manages its share. All families carry out jointly the forest monitoring process.

External disturbances: The external disturbance can be classified as linked to driving forces or pressure indicators, based on the type of disturbance. A change, for instance, in policy and therefore in legislation can act as an external disturbance to the CPR and its management. In the case of Albania and Shkumbini river basin, the legal framework does not regulate forest commons. As a result, all current forest commons exist based on traditional and historical knowledge; professional and technical knowledge and willingness of municipal officials to support commons; donors' projects experiences; a weak system of conventional governance in terms of financial and human resources – this forces local officials to look creatively for forest governance ways that do not pose any financial or human resource burden. A political and legal basis for forest commons is not available. Benefiting from the system of users association established in late `90s and reinforced in early 2000s, the local officials have been promoters of an informal network of commoners and forest CPR across the territory of the river basin.

External disturbance would be raised in case the legislation will change in a way as to induce changes in the status quo. The changes could be positive and support further the

CPR forest governance system, as well as could hamper it. This is unknown and the commoners are not able to predict outcomes and prepare for managing under uncertainty.

Other known (pressure type) external disturbances are: i) commoners leaving the country side and moving to urban areas, therefore taking less or no care for their forest share; ii) residents from the nearby villages without forests, who enter the forests informally and withdraw wood for heating; iii) companies who are granted licensed rights for harvesting timber in common forests – this is a highly conflicting case, because the commoners base their rights on traditional and historical criteria, which are however not warranted by law. The companies on the other hand, have a law-based license contract with the government or the municipality and apply a very high discount rate on the forest.

Governance system age: The age of governance system is linked to the type of the governance system and therefore acts as a driver in a DPSIR analysis. The definition of the governance system age in the Shkumbini river basin depends on where the time line is drawn. The forests commons existed since ages in Albania/the basin. The traditional and historical knowledge of forest commons has survived centuries and because it is so old, it has made it to survive and provide benefits in forest governance even after 50 years of private and common property suppression. However, the current system of forest commons, reborn after 50 years of commons' silence is only 20 years old. Referring to Edgar *et al.* (2014) in (SESMAD, 2014/a), it is older than 10 years, and it is assumed to perform better in terms of conservation benefits. Still, it is a weak system, because it is informal, so it has not yet achieved its full potential in this regard.

Governance system description: The type of governance system is a typical driver in a DPSIR analysis. It sets the path for natural resources governance and use. The chapter 4.1 and section 4.3.1 provide a detailed description and analysis of the governance system. In summary, Albania and each territory has a combined top-down and bottom-up approach. By law, forest governance is top-down and somewhat decentralised. The informal system of forest commons is bottom-up and highly decentralised. These two systems have the potential of creating robust multi-tiers polycentric governance, but the lack of legal acknowledgement of the second, in the cultural context of Albania, creates an obstacle in this regard. The forest users association (legally recognised) constitute a strong element

that should be cleverly used to reinforce the collaboration between the top-down and bottom-up approaches in forest governance.

Governance system spatial extent: The spatial extent of the governance system is linked to the type of the governance system and therefore acts as a driver in a DPSIR analysis. The duality observed in the governance system description, is observed also on the level of the spatial extent. The top down approach, aka the conventional governance approach has two different types of spatial extent: the national government operates the protected forests that have a spatial extent varying from few hectares to some km squares and distributed over the country; the local government organised around 61 municipalities, manages forests based on administrative borders.

Prior to the territorial and administrative reform of 2015, Albania had 373 local governments. This administrative territorial structure was very fragmented, but organised around sub-watersheds (in most of the cases) and with smaller size territories. In these conditions, managing forests was relatively easier and more ecologically fit. The significantly increased size of the new municipalities is expected to prove efficient in terms of public services, but not in terms of forest governance. As analysed in section 4.3.1, the number of forest officials has reduced drastically, while the size of the forest territory to manage has increased by manifolds. Furthermore, forest distribution and ecological interactions were not considered as a criterion of territorial subdivision/merge in the territorial and administrative reform. As a result, the larger size of the municipalities has not managed to internalise the boundaries mismatch issue in ecosystem-based forest governance.

The spatial extent of the forest commons governance has a different character from both of the above cases. Forest commons are dispersed over the territory, have varying sizes from 1.5ha to 200 or more ha, and follow the pattern of rural settlements location and fragmentation. The boundaries mismatch is even more evident in the case of forest commons – the services they provide exceed the scale of the common. The illegal exploitation of forest commons by external users (not those who manage the common) mainly for heating purposes is an indicator of how the commons' boundaries are often in risk.

Horizontal coordination: The horizontal coordination is present and happens both formally and informally, with the latter being more prominent. This type of coordination is necessary, both as a driver and response at driver level, for enabling multi-tiers polycentric governance. The forest users associations are the formal institutional structure that guarantees horizontal coordination. On the informal side, forest users have established a direct communication with the municipality, the federation, and other stakeholders who benefit and/or exploit forests. Because this process is mostly informal than formal, its power in enabling the multitier polycentric governance is fragile.

Institutional diversity: Institutional diversity – both a driver and pressure on environmental performance (through the policy system and the review of the policy system and legislation) is low in the forest commons governance set-up in Shkumbini river basin. If institutional diversity were high, it would easily turn into a response through enabling and promoting multi-tiers polycentric governance. The same pattern of organisation is identified in all of the areas of research. The major common feature is that of self-organisation in a commons system – thus individual shares of a common forest per each family. The differences stand on the size and composition of the user group. The size varies from 15-200 members and composition includes either family members (the small users' group) or village families (the large groups). In all of the cases, but one (Griqan i Sipërm in Labinot Fushë, Elbasan) the head of the user's association plays the intermediary role between the commoners and the municipality. In all of the cases, the municipality maintains also individual contacts with each family.

Social-ecological fit: This variable affects both pressure and state indicators. It is currently low for the formal system of forest management in the Shkumbini river basin, especially now that municipalities have increased in size, without having the socio-ecological fit as a key criterion of the territorial administrative reform. It is low also for the forest commons, because the latter is an informal system and as such it does not internalise the spatial outreach of the forest commons' ecosystem services. If the system was formal, by operating on a sub-watershed scale and reinforced with the scientific knowledge of the municipal officials, the system would have a good socio-ecological fit. If it were to operate in a network system of governance, with the users associations as the leaders of the process, the socio-ecological fit would be achieved on a basin scale.

Current institutional arrangements within a forest share fit with the ecological or physical features of the common, but do not consider the effect that these features have beyond the common's boundary, through the ecosystem services the common forest provides.

Policy Instrument: Policy instruments put a pressure on how forests use and management takes place, but act also as a response towards unsustainable forest governance practices. The following policy instruments are valid not only for the Shkumbini river basin, but the whole country. To start with, the Government of Albania has not articulated forest commons as an intentional objective in forest governance. It has not regulated them by law and is making resistance in terms of including a commons' system or common forest property in the forestry legislation. Having said this, there are a number of instruments that do support or enable the establishment of a forest commons' system, though not as a direct intention. For instance, the government recognises the need for market-based instruments. It has established a system of licensed-rights for forest use. The latter, in absence of sustainable forest development policies, has overexploited forests. However, if it were reconceptualised, it would serve as a positive instrument to keep forest governance away from the "command and control" approaches. The forest moratorium is a step in this direction, by placing a ban on the timber export.

Furthermore, the local governments have the right to set a tariff for the extraction of heating wood. The forests users' associations can apply for grants to advance forest commons protection and maintenance. The national government has a program through which is planning to implement at least 10 cases of payments for ecosystem services. None hast take place so far, but the program is still going on and being supported by the World Bank. The government has declared 15% of its territory as protected area and is planning to employ new technology standards as a means to achieve its targets of climate change prevention, in the frame of Paris declaration.

Type of formal governance: The conventional governance system is the main driver in establishing scenarios for forest management and use. The details of the formal governance were provided in the chapter 4.1 and section 4.3.1. As summary, formal governance includes the Ministry responsible on forests, the state agencies responsible of forest protected areas and municipalities. The instruments and regulations that these

institutions refer to for governing forests are rooted in the legislation. Furthermore, the law defines that forest management should take place on the basis of the provisions made in local forest management plans. Each plan has a life expectancy of 10 years and should be revised after this period. Land conversion on the other hand takes place through the territorial development plan and it is effectuated through minister or government's decisions, depending on the size of the required forest conversion.

Transaction costs: Transaction costs place a pressure on the commoners' group and therefore also on the forests. High transaction costs can impede collective action, while very low transaction costs would contribute to the transfer users' rights to other actors, who are willing, or able to pay higher prices for them (SESMAD, 2014/a). All municipalities in the basin have transferred their transaction costs to forest users in the case of the common forests, due to not being able to compensate these costs. The commoners on the other hand have found a system of commons governance that lowers further the transaction costs, by deciding to manage individual forests shares in a decentralised approach. The joint monitoring is a relatively low transaction cost that they accept to share, as a means of protecting the transfer of users' rights (even the informal ones) to other villages/actors/users. Lack of trust among commoners, as a cultural feature of the local population, is also a key factor for them choosing to employ a heavily decentralised system of forest commons. The latter decreases a lot the transaction costs and provides opportunities for urban residents (informally) and licensed companies (willing to pay higher transaction costs) to get a portion of the forest users' rights (see section 4.3.1).

4.4 Conclusions on enhancing the governance of forests in a river basin through CPR lessons

This research was developed within the broader theoretical framework of common pool resources and ecosystem-based governance. It had 'the use of CPR governance lessons on sustainability and resilience for mainstreaming ecosystem principles into conventional forest governance' as its central question. The aim is not simply to borrow lessons, rather than see how multitier polycentric governance can be enabled. It was assumed, based on theoretical studies, that territorial, multi-tiers and polycentric governance is capable of

bringing forward healthy synergies between institutions (at any interaction tier) and incorporate ecosystem values as core criteria in policy decision-making. Theoretically, it was also shown that CPR institutions are robust in the presence of certain design principles and if this is the case, ecosystem values and principles are then inherently a built-in feature of the system. While continuously improved scientific knowledge contributes to the gradual disclose of these values, in fact they exist within the CPR system, intuitively and as part of the traditional knowledge passed down to generations and families.

It was also argued, both theoretically and case wise, that conventional governance invests in developing and promoting scientific knowledge and institutional arrangements that have ecosystem-based natural resource governance as their core purpose. However, regardless of the intention, conventional governance models fail often in achieving the goal of sustainable development. Socio-ecological interactions and therefore systems become more and more complex with the increase of the scale. As a result, not only CPRs (claimed to be successful in the small scale) do not flourish in numbers on the large scale; also the positive results of the commons' models at the small scale do not manage to affect global outcomes. Hence, the argument was made that boundaries and scale mismatches are a key factor, and seemingly also an obstacle in the development of ecosystem-based governance of natural resources.

Forests are the natural CPR selected for this research and 'boundaries and scales' constitute a complex concept, composed of physical (space), time and institutional interactions dimensions. Boundaries and scales feature both, the institution/the organization and the natural resource and its ecosystem services.

In order to understand boundaries and scales, an examination of both the forest commons and forests conventional governance for Albania was made. This analysis was detailed further on a territorial scale, such as the river basin. The river basin territorial scale is regional – hence an intermediary elusive level between the fixed national and local territories, and it is also natural. The latter means that it is not affected by the artificial designation of administrative boundaries. By contrast, it is defined by the geography, the

ecosystems and their interactions, and the interactions between ecosystem services and services' users, be those territories or people.

The CPR governance is not a political pre-designation of powerful actors. It is a genuine community organization thriving on specific conditions, and fuelled by the complexity of socio-ecological interactions, perceived in relatively small territorial scales. The CPR governance is argued to be polycentric, but again on a small scale. Exploring the CPR governance models on larger scales and for larger CPRs, suggests that at least the criteria for 'polycentric interactions' and 'genuine socio-ecological interactions' should be kept. It is was assumed in this research that it is possible to identify the presence of these criteria in a river basin, while it is hard to define them within administrative local and/or national boundaries.

The most straightforward finding of this research is that a forest commons' system has always been present in Albania (as it is the case for most countries explored through international research), it ceased functioning for half a century and redeveloped again after the dramatic socio-political and economic transformations of the early '90s. The redeveloped system, which was subject to this research, is a creation of the exogenous and endogenous societal factors during the 20th and 21st century, it reflects the societal transformation and embodies flexibility and adaptability as its most essential features. This forest CPR system is informal – i.e. based on traditional customary arrangements only, and works on a local sub-watershed scale. It receives support from donors, municipalities, the network of forest users associations and the forest federation (national and with regional branches). The associations and the federation constitute a crucial social innovation factor that contributes towards the intensification of the 'polycentric' feature and the strengthening of the CPRs' potential to function on a larger regional scale. This network of organisations operates both vertically and horizontally, and it impacts conventional governance by increasing the incorporation of comprehensive ecosystem values in policy-decision-making and governance actions.

The following tables provide the major characteristic of the forest CPR governance in Albania/Shkumbini river basin. The first table summarises the 8 design principles of robust CPRs. The second tables, explores other variables built on the basis of SES model,

aiming at understanding larger forest CPRs and forest CPRs on a larger scale. The analysis of both, the 8 design principles and of the SESMAD variables intends to shed light on the 'boundaries and scales mismatch' theoretical discussion and therefore also on the possible ways for mainstreaming ecosystem values and principles in the conventional forest governance model.

Table 7. Summary of findings on the Forest CPR design principles in Albania/Shkumbini river basin

Forest governance in Albania	There are 3 concurrent types of arrangements on local forests' governance – 1) privately owned forests; 2) village based decentralized commons' regime; 3) licensed rights granted by the municipality. All implemented under municipal governance. Albanian forests legislation shows that the government is mainly applying the Morris Cohen instrumentalist approach of property, which supports changing public priorities by adjusting the powers of ownership and even redistributing privately owned resources over time" (Raymond 2003). The municipality, as a public body has the responsibility in managing all local the forests. The forest commons' system is informal.
1. Principle - well defined boundaries (spatial and rights)	
1.1 *Users rights:*	Hard to define boundaries properly due to lack of a recently updated forest cadaster and continuously changing forestry policies. Rights on commons defined informally based on historical, traditional knowledge and customary arrangements. At the municipality level: mixture of institutional management with add-hoc and people's based management of forests.
Access	The national forests are environmentally protected areas: free access, but rules on activities. The level of accessibility and protection depends on the features and the classification of each area upon the legislation. Municipal forests: free entrance, but restricted uses. Extraction regulated under contracts. Municipal forests managed under a commons' regime: access is possible, but commoners control it. Historical ties and proximity features are criteria for 'transferring rights to commoners'. Still there is no discrimination of other users, wherever they live.
Withdrawal	Withdrawal activities are not allowed in environmentally protected forests. Municipal forests: withdrawal happens through usufructuary rights for villages (commons), or licensed rights for individuals. Licensed rights include selling; usufructuary rights do not include selling.
Management	The public authorities for protected areas manage the environmentally protected forests. In commonly managed forests: historical types of 'fencing' (boundary). The users/owner are/is responsible of maintaining the health of the forest while harvesting it, in compliance with the legislation and other technical provisions set by the respective municipality in the forest management plan. In all municipal forests: the proprietors and municipal officials take care of fires protection, through monitoring and intervening for emergencies.
Exclusion	The managing authorities of environmentally protected forests may set exclusion rules for access to certain forests or ecosystem parts, depending on the biodiversity value and ecosystem services they wish to safeguard.

	Full exclusion in privately owned forests, but not in commonly shared forests. The users exercise some exclusion rights in the latter case, but cannot exclude someone from walking in the village forest.
Alienation	Private owners can sell their property, but holders of proprietary rights have no alienation rights. Municipalities cannot sell for legal reasons, but also because the forest property registration is far from being completed. The Minister responsible on forests, or the Council of Ministers has the right to approve the conversion based on the size of the respective forest area, as defined in the municipal territorial plans (GoA 2005).
1.2 *Are appropriation and provision rules derived from historical practices (specify)*	The intention to manage forests in common, the related knowledge and arrangements are historical, but readapting - for instance the full decentralization of the commons system. However, there have been 5 major donor projects in the last 20 years that played a major role in reviving the commons' practice in Albania, after the fall of the centralized political and economic system.
1.3 If not historical how and why (what were the key motivations) did users group started?	The role of donor projects has helped in promoting foresters to manage the forest in common by raising capacities, providing grants for forest improvements, supporting the establishment of forest users associations and funding some of their forest maintenance activities. To date there are more than 200 users associations. The criticism towards the associations highlights their top-down establishment (pushed by donors and government), thus being unsustainable in case of no funds. Still they play a role in keeping the forest community together and voicing its concerns.
1.4	
Membership	No any compulsory form of membership to the group. The common forest is subdivided into use shares, so if a user decides not to use its share, or move out of the agreement, this should in principle not affect the others. There is non-compulsory membership in the users' association.
Free entrance/exit	Free entrance is possible, as described above, but it is suggested to take place under supervision of the user.
Origin of ownership inherited-bought	Privately owned forests are inherited. The forests managed in common have a history of officially unrecorded, but widely and informally recognized as "village ownership".
Ideal share	With few exceptions, the internal agreement is usually verbal and based on historical trust. The families' shares are usually proportional to the size of each family and based on historical knowledge on the shared use of the resource.
Right to sell rights	A forest commoner cannot sell its rights. They are also unwilling to sell rights, due to the historical link with the property and the pride on the property. The spiritual and cognitive development value is very high and evident.
Growing number of urban owners	Commoners live nearby the forests. Some of them migrate and as a result, the number of urban "forest-owners" has increased overtime. Still, they turn to the village every summer, or in some cases work between the village and the city where they live, in order to develop/manage the forest.
2. Principle - proportional equivalent of cost and benefits	
2.1. Is forest regime-entity self-financed or depended on external donors	The Municipality/Ministry and external donors have been so far the key funding sources to the forest management system in Albania. Donors have been/are interested in establishing a strong commons' regime and ecosystem-based management system for forests, therefore supporting forests' stakeholders since 1995. Local foresters constitute another but very modest funding party. In overall, there is a disproportionate relation between costs and benefits that each party bears/receives.

2.2. Development of management rules by?	The rules and criteria for allocating/licensing users rights to individuals and commoners, together with fund allocation and disbursement are defined in the legislation, in agreements/contracts and in verbal agreements (the case of commons). The legal rules are nationally defined, and are broad. There is no typically any customization. Commoners set informal verbal rules among them, while the relationship with the municipality is both verbal and written.
2.3. Are cost benefits of shareholders balanced proportionally to the size of the resource	The users operate in a more individual and profit-based level, aiming at receiving the highest benefits at the lowest costs. While local users have a direct dependency relation with the forest ecosystem, therefore safeguarding them for the future, the licensed companies apply high discount rates to receive the highest value in the shorter term. In many cases, the companies have not planted new trees after cutting the timber as set in their contracts. Commoners share responsibilities and the expected benefits proportionally to the size of the family – thus forest share, and based on historical relations with the forest. The aim is to generate surplus to cover costs and provide minimum family revenue. Still, commoners cannot sell forest products and are keen on applying high discount rates for saving future value.
2.4. Is management profit/non-profit oriented	The overall management of forests from an institutional perspective is as follows: public in the case of municipalities governing the resource through their own enterprises; non-for-profit in the case of activities carried out by the users associations; profit making in the case of licensed companies; and profit making with low discount rate and high social responsibility in the case of commonly managed forests.
3. Principle - collective choice arrangements	
3.1. Who represent forest community formally	The users themselves and the 251 users' associations represent the community of local foresters. The national forests federation and any policy process related to forests governance. The associations are registered in court with an NGO status. Since two years the national forests federation and the users associations have engaged in a critical lobbying and advocacy process to influence the new forests' law, to include communal property and all relational matters. One of the major issues they raised is for the law to recognize village ownership on forests (FKPKK 2016).
3.2. Are individual or collective users participating on decision-making?	Municipalities prepare the Forest Management Plans (FMP). The current FMPs are old and their full update is rather costly. The forest users participate in the update process by expressing their interest on the management of the forest, but do not affect decision-making.
3.3. How internal decision making rules function?	Internal decision-making takes place through common (verbal) agreement within the group that shares a forest. The small size of the group makes internal communication much easier, but contributes to system's fragmentation.
3.4. Who has rights to change the use of land?	The Minister responsible on forests, or the Council of Ministers (area sensitive) issues the respective decision, based on territorial and forest planning instruments.
4. Principle - monitoring	
Monitoring	The owner/user monitors daily the forest to make sure others are not entering, harvesting, or damaging it. In few cases owners hire watchmen, while proprietors monitor by themselves and jointly. The municipal and national inspectors carry out forests' monitoring.
5. Principle - graduated sanctioning	

Graduated sanctions for violation of rules	Forest owners and commoners do not apply sanctions. They request for support to the municipality. The latter applies penalties as defined in the legislation. The system of penalties was that of a "graduated sanctions" till one year ago. Since the moratorium is in place the inspectors apply a fixed-penalty of app. 45,000 EUR for each violation (GoA 2016). The inspectors are aware that local users would never be able to pay such fees, so they informally apply the "graduated sanctions" system, with warning as the initial step in case of noticing a violation.
6. Principle - internal conflict resolution mechanism	
Conflicts resolution	In case of conflicts, resolution follows a step-by-step approach. Initially individuals involved in conflict try to solve the conflict amicably among them. If no solution is found, then the village alderman and/or the representative of the users' association intermediates between the conflicting parties. In other cases, all members get together and try to reach a solution. If the conflict remains still unsolved, then the parties ask the municipality as an intermediate. Las but not least, there are also cases of two litigants only, where no solution is found and the conflict remains.
7. Principle - interconnection of present rules in use with historical management guidelines	
7.1. Rules accepted by authorities?	To date, the forest governance system allows for common management of forests to take place, but is vague in terms of legal provisions related to commons' regime. The local users' associations and the forest federations (national and regional) advocate on behalf of the local appropriators, insisting that the law should include common and village property on forests based on traditional links. Current internal rules in the case of commons do not appear in the legislation, but this can be subject to bylaws, once law will recognize the commons' regime and property on the commons.
7.2. Juridical status of CPR regime	The juridical status of the forest considered for use as common pool resource is municipal property given in use to local appropriators through the use agreement.
8. Principle - nested enterprises	
Integration of CPR regime in national law	The users' associations that act on behalf of the local appropriators have an NGO status, but they have no user rights. They advocate and lobby on behalf of the users/proprietors and when funds are made available to them, they also support commoners to maintain the health of the forest. The associations are not very effective to date due to lack of financial sustainability, but they constitute the hook for pulling a system of forest commons, by having the ability to penetrate locally next to organizing in a polycentric network. The latter is vital to establishing a national system of commons and can sustain the management of large commons on ecosystem principles.

Source: This table was compiled as a summary to the analysis of the 8 Ostrom's principles following the methodology and definitions of Kluvánková and Gežik (2016).

Table 8. Summary of findings on the large Forest CPRs - SESMAD variables for the Shkumbini river basin

No.	SESMAD Variables	Summary of evidence
9	Dependence on the Resource (economic dependence)	Moderate dependence on the resource. The law does not permit for substantial benefits – provisioning services withdrawal. The commoners have a strong sense of pride on the common – high cultural and cognitive development values.
10	(Actor) Group size	Varies from very small in one sub-watershed to large in others.
11	(Common) Political	Low political power. Support being received from donors, the national

	power and civil society	forest federation and the users associations.
12	(Actor) Scientific knowledge	Good traditional knowledge but low scientific knowledge. The knowledge is rather intuitive.
13	Actor adaptive capacity	High adaptive capacity, impacted by the types of livelihood alternatives, the historical context and socio-political and economic transitions.
14	Actor traditional knowledge	Very good traditional knowledge. It is one of the strong and key factors in supporting the presence and functioning of the commons system on forests.
15	Ecosystem service management	This is not a mainstream approach, due to low users scientific knowledge and moderate scientific knowledge of municipalities. No policy articulation of the ecosystem-based management approach for forests. Donor projects have provided support, but it has not been a government priority.
16	Economic heterogeneity	Low economic heterogeneity at commons and regional level. However, urban-rural disparities are very pronounced.
17	Leadership	No leadership among commoners. The commons system is very decentralised. Each family is managing its common's share. The users associations play a facilitator's and intermediary role.
18	Leadership authority	No leadership subsequently means not authority. However, the users' associations have a medium level authority.
19	Livelihood alternatives	Low dependency on forests, hence diversity of livelihood alternatives (agriculture, trade, administration, services, remittances). This has increased the group's resiliency. It has not damaged the commons, because the interest on spiritual and cognitive development values is high.
20	Property regime	Forests property is as follows: around 15% state, around 82% municipalities and 3% private. No common property regime. There are legal provisions on the licensed – rights. There are provisions in the Civil Code on the usufructuary rights, but there is no specific regulation in the forest law on the commons.
21	Property security	Is low for the commoners. They have no alienation rights and the commons' system is not regulated by law. It functions informally.
22	Cultural heterogeneity	Low heterogeneity at the commons and sub-watershed level. Medium heterogeneity on a regional level. High heterogeneity in the urban areas that receive forest ES from the basin.
23	Technology role	Acknowledged by the government, but not used as yet, neither by commoners, nor by the government.
24	User group external support	Support received by: forest users associations, the national forest federation, the donors projects, and to a lower degree also by the state forestry extension service. The support has been crucial in promoting the continuation of a commons system after the radical socio-political and economic transformations of 1990.
25	User-commons proximity	Commons very close to users – a criterion for being selected as a commons. The fragmentation of commons in the landscape has the same pattern as the fragmentation of the rural settlements.
26	User group well-being change	Moderate improvement. However, emigration rates are also high.
27	Resource characteristics	Forests of oak and to a lesser degree also ash. Located on hilly slopes and moderate altitudes above sea level.
28	Commons heterogeneity	Low heterogeneity in terms of the wood species. Very high heterogeneity in terms of spatial distribution. The landscape fragmentation is high due to previous deforestation and consecutive erosion. It also reflects the distribution of rural settlements across the territory.
29	Commons spatial	Patchiness is visible across the landscape. The size of each common

	extent	forest varies from one sub-watershed to the other.
30	Provision services conditions	Good for the healthy common forests; low for the forest that are managed by the municipality – deforestation takes place illegally.
31	Regulating services conditions	IDEM as for provisioning services.
32	Cultural services conditions	IDEM as for provisioning services. The commoners place greater value on the cultural services than on the other ones. This is partially affected by the low dependence on the resource and partially by the strong historical ties with the resource. Pride on property is a key factor in defining the strong spiritual connection between the forest and the commoner.
33	Governance system effect	The conventional system of governance is top-down and has a poor cooperation with the CPR governance model. The conventional system has no ecosystem-based agenda.
34	Centralization	The conventional governance system is top-down and somewhat decentralised. The commons' system is fully decentralised. Each family manages its forest share from the common forest.
35	External disturbances	External interventions from other actors to the community forest management impact the commons' system. Changes in the legislation would either hamper or improve the commons' system.
36	Governance system age	The traditional commons system exists since centuries. The current commons system (effectuated after the socio-political transformations of 1990) exists since 1995.
37	Governance system description	Combined top-down and bottom-up approach. By law, forest governance is top-down and somewhat decentralised. The informal system of forest commons is bottom-up and highly decentralised. These two systems have the potential of creating robust multi-tiers polycentric governance, but the lack of legal acknowledgement of the second, in the cultural context of Albania, creates an obstacle in this regard.
38	Governance system spatial extent	The conventional governance has two types of spatial extent: national (protected areas) and local (all forests in the municipal territory). The commons governance has decentralised and varying spatial extent, linked to the location of the commons and to their spatial heterogeneity. The network of commons is organised around sub-watershed and around the basin through the support of the forest users associations.
39	Horizontal coordination	Present through both, formal and informal communication. The informal interactions are more prominent.
40	Institutional diversity	It is low in the Shkumbini river basin.
41	Social-ecological fit	It is low at municipality level, it is high on the basin level, it is low at the common's level, because the CPR system is informal.
42	Policy instrument	A variety of instruments are used, not necessarily aiming at enabling commons. However, these instruments support commons: licensed-rights system; tariffs for wood for heating; auction for distributing licensed rights; protected areas; technological improvement is aimed; payments for ecosystem services are aimed, but not implemented.
43	Type of formal governance	Territorial plans as a means for land conversion; Forest management plans as the means for defining forest governance; Legislation as the basis of all necessary regulations.
44	Transaction costs	Low transaction costs within a commons' organization – each family manages a share of the common forest and all families carry out the monitoring process jointly.

Source of variables: SESMAD database https://sesmad.dartmouth.edu/variables. This table was compiled as a summary of the analysis made by the author on the SESMAD variables.

By analysing these design principles and SES variables, this research intended to contribute to a number of research purposes. Hence, the following was achieved:

- A meaningful case of Albania forest commons was developed and it can be now added to the international repository of cases of commons' typologies. Of course, this is merely the beginning of the research work to be undertaken on commons (not simply forests) in a context where for half a century the government performed in total disregard of the commons as a concept and practice. The commons saw their return with the demise of the past political regime. This research has identified the capability of the SES and forest commons to adapt to changing circumstances and produce models that fit well to the institutional and ecological context. It is not clear how do commons thrive for other resources, such as water, fisheries, irrigation systems, and river basins. The comprehensive analysis of commons would provide a clear understanding on the Albanian case and would contribute to the better understanding of the 'boundaries and scales" discussion.
- The large scale for forest commons management and the large-scale forest commons were examined in the Albanian case and contribution to the current international efforts on empirical observations of these subjects can be now made. By analysing the small and the regional scale forest CPRs in Albania, using both the 8 design principles and number of variables that the CPR theory does not usually capture (articulated as the SESMAD variables), it is possible to trigger lessons that contribute to the achievement of the sustainability and resilience objectives on a global scale. Albanian forest commons show for lack of robustness on the small scale, referring to the examination of the 8 design principles. However, Albanian forest commons do not merely exist; they are vitally growing organizations of a very context-specific character and place-based approach, thriving in a legally hostile environment and producing social innovation for the management of forest commons at the larger regional scale. These CPR institutions show a pattern of endurance, regardless of the harsh transformations that Albania has undergone from a socio-political and economic

perspective in the last 100 years. This is so, because these forest commons' institutions are characterised by: flexibility and adaptation; uninterrupted traditional knowledge, passed down to generations and families; spiritual, cultural and cognitive development ES values that are higher than the provisioning values; interventions to community forest management that have and still are striving to mainstream scientific knowledge within local stakeholders; the existence of social innovation through the establishment of a network of users associations, as a means for fuelling multitier polycentric governance.

- A discussion on scale and boundaries for ecosystem services management is generated in the context of Albanian forest commons. It is shown through the description of the resource and the analysis of the relevant territory/ies that Ecosystem Services boundaries do not match commons boundaries. This is a biophysical fact – ES exceed the scale and the physical limits of the ecosystem that provides them, as well as an argument raised by the discussion on actors interactions and government systems. The official arrangement of the user rights happens mainly through a licensed rights system (exploiting provisioning services), with no consideration of the proximity and traditional knowledge principles. This leads to market failures that in absence of clear and enforceable property rights over forests and ES benefits, leads further to forest overexploitation. For instance the system of forest commons is not formal and the commons are continuously in danger of illegal exploitation. The forests are mainly public property (with the exception of 3% of forestland) and the so-called 'higher forests' (those located in high altitudes above sea level) are cleared informally. As the forest moratorium was not preceded by a proper study of effects and did not provide alternative for heating, transaction cost of wood selling have increased – forest cutting takes place illegally.

  The property rights system on natural resources is based on utilitarian values only. There is no recognition of the inherent values of the ecosystem. There is not even a public recognition of the cultural and cognitive development values, though these exist. The community is not able to articulate these values, but it does articulate the willingness to protect forests for spiritual and pleasure purposes and

for pride on property.

Those who receive cultural and regulating services generated from forests in the upper areas of the basin, live downstream, in the lower areas. The latter are not only consuming ES, they are also generating pollution and pressures on the ES, without any compensation. There is no recognition so far on the ES that the rural and mountainous territories provide to the urban area.

Payments for ecosystem services and environmental taxation for ES are not yet implemented by the Government. A system of commons' users rights does not exist and the current set-up of forest commons takes place informally. This informal system has proximity and traditional knowledge as its core features. However, the low or lack of scientific know-how on ES, contribute to both, the lack on government's interest on legalizing the forest commons and the poor ability of the government to introduce ES into the policy decision-making. ES are often considered through sectorial lenses and a coherent and comprehensive framework dedicated to ES as commons and crosscutting among sectors, is missing.

- A first attempt of operationalizing the role of ES valuation in ecosystem governance and planning is made, through constructing a logical model of mapping both, the demand and the supply for Ecosystem Services. While most of the scientific and practical efforts go to the mapping of supply, there is also a need of understanding demand for ES. This can be done through matching the ES supply budgets with ES demand budgets, mapping related socio-economic indicators and mapping the systems and interactions among actors. This research has mainly contributed to the mapping of ES supply-demand budgets – by applying an existing model in the Shkumbini river basin territory, and making the analysis of the governance system/s and actors interactions. The research shows that future-mapping efforts should be based on data generated at the micro-level of each ecosystem service, through measuring real use and exploitation level.

  The research has revealed that while the conditions of common forests have improved with time, the conditions of the forests on a large scale are worsening.

The speed at which the forest commons' governance is advancing beyond the small scale and towards a more regional scale is still low, compared to the pace of forest exploitation taking place under the conventional governance model. Now that the municipalities have increased in size and complexity (due to the territorial-administrative reform), one of their hardest tasks is to generate data for multiple territories (urban, rural, natural, agricultural) and issue crosscutting decisions. For instance, those dealing with forestry work only in a rural/natural environment, but the decisions on land conversion and territorial use are made within the planning department. The latter has limited knowledge of the rural territory while the previous has yet to understand how forest ES are used by the urban settlements and industrial land uses. The merge of different functional territories under one local government unit was deemed positive as it would avoid fragmentation and would increase economies of scale. However, human and financial capacities for performing within this new construct of local government are low. This places the whole ecosystem-based governance principle at very low levels of the governance agenda.

Box 6. ES in Shkumbini river basin

Regardless of the intensifying urbanisation process, the increasing deforestation, the high fragmentation of forestland and pastures, and the deterioration of other natural resources from pollution, the basin's territory remains still rich in natural resources. The latter provide numerous ecosystem services for the humans in the urban and the rural areas, as well as for the ecosystem itself.

The location of service providing and service demanding areas is distinct. The previous are mainly situated in the upper and middle parts of the basin, in the contributing zone and to a lesser degree in the conveyance zone. The latter are located in the lower area of the basin, close to the agriculture land and the main channel of the river stream. The service demanding/benefiting area is not only consuming most of the services provided by the natural resources, regardless of the distant location; it is also placing significant pollution pressures over natural resources, especially water.

The commoners are located close the forests – the proximity principle, and the

common forests are in close distance to the rural settlements, therefore being easily accessible by the users and easy to monitor and protect from intruders. These are mainly oak and ash forests, located on hilly slopes, on moderate altitudes above the sea level (mainly the conveyance zone and a part of the contributing zone). The commoners have a strong spiritual relation with these forests that used to be common, or village property prior to 1944. This pride on property is a key factor that guides the care and interest of commoners on these forests. Cultural rather than provisioning services are those that commoners value the most. Hence the historical and traditional links guarantee the sustainability of the resource and the robustness of the commons system. Differently from these commonly managed forests, the forests of beech, pine and fir are located on the higher mountainous slopes, far from the rural settlements, therefore not being classified as commons. The lack of historical user rights, the long distance from the resource, the difficulty of access and monitoring, and the limited human and financial capacities of municipalities are the major reasons that lead to their depletion. Their management does not happen under a commons' system, the municipality does not monitor the forest daily and the villagers and licensed companies exploit forest resources illegally and by applying a high discount rate of return.

The neutral budgets, those where ES demand and supply equal each other are present in the collection zone of the basin (the lower area). From a land-use perspective these areas contain agriculture and low vegetation, as well as urban developments. The maps show that most of the basin's territory is not suitable for agriculture and it is forest and natural land. However, the existing agriculture, industrial and urban areas are located over the aquifers placing enormous pressure on water supply, quality and availability. Forest management should therefore be combined with water management, as it should with energy policies. Forests have always positive budgets for all of the regulating services, but due to the physical distance from the service benefiting areas and the low scientific awareness on regulating services, the institutions, the urban beneficiaries and the commoners do not govern forests through following ecosystem principles. The risk for forest

conversion into other land uses is always present. In the future, the conversion was mainly due to agriculture land expansion. To date, the risk is related to urban and touristic development conversions.

The capacity for tourism development is very high almost everywhere in the Shkumbini river basin, due to the numerous natural and cultural sites. However, tourism development is mainly perceived as land development for use in tourism, rather than activities that promote and protect nature. In these circumstances, the cultural services risk loosing value in the future. This is not the case for the forest commons, where cultural and cognitive development values are highly appreciated. However, these forests are not easily accessible for tourism activities, due to the exercise of proprietary rights from the local users. This means that while the forest commons should further increase and strengthen (in size, and institutionally), the users' rights should be modified to allow for sustainable tourism development.

Though a commons system on forests has survived and is functioning in the last 25 years, regardless of the extreme oppression of 50 years of centralised economy in a socialist state, there is a risk for it to weaken. This is due to two major factors: the continuous lack of legal support for the CPRs; the population dynamics – people moving from the rural to the urban areas, or abroad, hence contributing to lost bonds between people and forests. The population dynamics of the last 27 years and the clear division between land-uses, and therefore between service benefiting and service provisioning areas, are a clear indication in this regard.

- Some input was provided to the theory of multilevel territorial governance, though the latter was not a direct focus of this research. The ecosystem-based governance of forests (natural resources) is territorial. It is the result of socio-ecological interactions and not the prescription of a governmental body. It happens in a context of multitier decision-making, where several centres of governance interact for complementary power [re]distribution. The proponents of territorial multilevel governance discuss the subject mainly based on its origins – the European Union hierarchy of decision-making, and based on the evolution of

spatial planning as the area of research that is dealing with territorial development in a very direct way. The CPR and SES theories, and the analysis of Albanian forest commons – at both the small and the river basin (large) scale raises the need for examining the territorial multilevel governance focusing on each and every aspect that is noticeable on the territory. One should not confuse these territorial aspects with sectors. By contrast, each aspect, such as the different natural resources, is a governance subject and all of them are interlinked within socio-ecological systems. Hence the theory and practice of CPRs shows that multi-tiers polycentric governance happens at any given level in a SES and it is not merely a matter of hierarchies of decision-making, or comprehensive planning.

- Recommendations that are of benefit to the Albanian policy context on territorial development and ecosystem-based governance for forests are provided. These recommendations include the enabling of a system of multitier polycentric governance for forests as the means to guarantee sustainable forest governance and resilience of forests and forest institutions. Such a system incorporate also forest commons, as the core of the polycentric approach. The polycentric approach starts at the small sub-watershed level and completes within a river basin. The different interacting tiers of forest institutions should also embrace this territorial scale – from the common's scale to the river basin scale. The operationalization of this effort requires policy action and revision of the legislation to: include the commons system and preferably also the common forest property; provide a basis for increased security and lower transaction costs of the commons system; strengthen the role and the position of the forest users' associations as a fuelling mean for polycentric governance; undertake mapping of ES supply for forests and natural resources; undertake mapping of the demand for forest ES and compare through policy analysis the demand with ES supply; use ES supply-demand budget to shape territorial development and governance; formalise the role of the forest users associations and the forest federation in forest policy making, by creating a perpetual and common forum of forests that

supplies policy solutions to the forest governance system; define user rights for forest ES and match with the territorial scale.

Returning to the central question of this research, can forest commons' models positively influence the conventional governance setting and outmatch the 'boundaries and scales' mismatch? The experience of Albania shows that this is possible, yet very complex and a long-term achievement for scientists and policy-makers. Furthermore, it is context-specific. The features of Albanian forest commons that prove successful in terms of ensuring CPRs endurance and ability to cross scales may not necessarily be present (partially or in full) in another context. The modest research carried out internationally on large scale commons, shows that it is not yet clear what kind and how many variables are essential for being present at any time a CPR is successful in the larger scale. There is not enough evidence on this regard and further research is needed.

Regarding Albania: the informal practice of forest commons was born out of a combination of the necessity of government officials to get community support in managing forests, with donors' interventions to community forest management, and with commoners' traditional knowledge and cognitive development values. The commons system is highly adaptive and flexible; it has been resilient in an ever-changing context, therefore promising for sustainability. Right now, due to the lack of a formal frame of rules on commons, the forest commons' system is highly decentralised.

4.4.1 Boundaries - the challenge of the macro-scale

As Ostrom (2007) and other scholars and colleagues have repeatedly stated, design principles are not a panacea for the success of CPR institutions. Students and scholars working with commons need to engage further with more and different combinations of design principles and how they relate to different CPR settings (Schlager, 2016), therefore being place-based. Nevertheless, studies undertaken on comparing and coding cases provide useful insight on the necessity and/or sufficiency of having some of the principles to guarantee success and on what are those design principles that are associated with lack of success. "Overall, the more design principles are present in a case, the more likely the case is successful" (Schlager, 2016, p.407). In this view, Schlager (2016) considers also quite reassuring the fact that the principle of well-defined boundaries is

necessary, but not sufficient for success. Without clear boundaries, the link between users and the resources, both physically and in terms of property/user rights will be weak, hence leading to either an unstable system, or a lost opportunity for creating a CPR system at all.

In the case of Albania, a system of clear and enforceable property rights for commons is missing in the legislation. However, the customary non-formal arrangements on forest commons are characterised by traditional knowledge on user rights, cognitive development values and pride on property. These aspects of boundaries keep ties between users and resources very strong and make commons succeed even in a hostile legal environment. The existence of this 1st design principle opens the way for the resource users to explore in implementing and investing on the other design principles and capturing related benefits (Schlager, 2016).

Literature shows that if commons lack proportional equivalence between benefits and costs, accountable monitoring, and graduated sanctioning they are unsuccessful. Rules should be well-designed, appropriately monitored and enforced, to experience success. (Schlager, 2016). In the case of Albania, the rules are very simple and inherited from the tradition. Monitoring takes place jointly, but sanctioning depends on the municipality. More than the municipal sanctioning, it is the mental model of the common forest use that keeps the users within balanced frames of operation. The common's overexploitation risk is present due to external violation. The size of the common and its spatial fragmentation increase the risk of external violation and overexploitation. The forest users associations play a mediation role in smoothening conflicts and possibly avoiding violation acts.

The actors' group size varies from one location to the other and it is linked to the size of the village and of the common forest. Hence the actors' group size and location reflects the patterns of the landscape and vice-versa. The user groups external support has been present for years, helping the users to re-establish the system of forest commons and build a polycentric network that exceeds the scale of one common and extends over the river basin territory. The spatial extent of the governance system is limited into two scales: national and local. However, the local territories have become quite complex after

the territorial-administrative reform and it takes new instruments to adjust to the new scale. In the case of forest management, the conventional governance model has accepted (though informally) the network of commoners and the horizontal coordination carried out by the users associations in a watershed level. It is in this way that the local governments manage to protect around 30% of their forests (the commons).

4.4.2 Mainstreaming ecosystem services in the CPR model

While the forest commons endurance is positively valued in this research, mainstreaming of ecosystem services in the CPR and furthermore in the conventional governance model is still lagging behind. The commoners have good traditional knowledge, but do not take decisions based on sound scientific knowledge. The role of the municipal officials is weak in this regard and the user associations focus most of their support in mediation and forest maintenance activities. The donor efforts also did not succeed in building proper capacities, regardless of the efforts. The government of Albania (through the Ministry) as a key actor did not perhaps see value in the forest CPR system and it did not have the CPR as one own target. As Marshall (2008) suggests, actors tend to participate in activities designed to build their capacities, only when they expect participation to help further their goals. Hence, the capacity-building efforts will most likely not succeed, especially if the target population has not secure rights to benefit from the capacity building process.

In the Albanian context, the forest CPR system is informal and the property rights security is low for the commoners. It is based on customary arrangements, and on the free will and the understanding of local officials. This shows that while capacity building and institutional building efforts took and are still taking place, no rights were guaranteed, leading to a very decentralised commons' system. This arrangement serves for avoiding transaction costs in a context of lack of external security. The users associations and the forest federation are aware of this, and struggle to establish a system of full property rights on the forest commons. Therefore, mainstreaming ES [knowledge] in any CPR model has to be backed by strong incentives, i.e. property rights. The role of users associations is key in this regard as it pushes forward for what Marshall (2008) calls an authentic subsidiarity, with strategic bottom-up efforts mobilizing top-down support.

4.4.3 The challenge of Albania – what could we learn?

Albania has a mixed regime of forests management that combines conventional governance by public agencies at national and local level, with shared management of some forests at local level. This hybrid system has experienced severely abrupt changes overtime. This has been due to both, exogenous reasons, such as variations to institutions and legislation influenced by dramatic ideological shifts, and endogenous reasons, i.e. stakeholders' lack of experience, historical memory and coherence (Pejovich, 1990).

The commons' forests regime is present, but rather hidden. The law does not recognize the commons' regime; instead it provides for local forests being managed through a licensed-rights regime and through users' contracts (usufructuary rights) that one can associate to a commons' regime. The latter does however takes place informally rather than through the enforcement of the contracts. The conventional governance system recognizes only public and private ownership on forests. While, the system allows some shared management to take place, without properly specifying this in the law, it does not recognize forest common property. In summary, the system is a combination of two approaches, with the instrumental approach prevailing over the intrinsic one. The latter though, exists due to the practice of local officials, who have a preference in choosing traditional appropriators to render rights, versus those who have no historical ties with the forests. It also exists through the transfer of traditional knowledge on the forest commons through families and generations and their pride on forest property.

Ecosystem wise, the whole conventional governance system is built in a way as to emphasize utility values and provisioning services of forests. The law mentions other ecosystem services as well, but does not provide instruments to unravel the principle of ecosystem governance. Government and donor programs that have/had ecosystem-based forest governance as an objective, have either focused on strengthening institutional regimes of forest management, or have not managed yet to pull out ecosystem services improvement initiatives. Ecosystem-based forest governance remains as yet more of an intuitive approach rather than an official and rational choice of forest management.

By emphasizing the conventional governance, the law aims at enhancing the role of municipalities in managing forests. However, the commons' regime on forests has also

gained space practically through donor-funded projects (ate least 5 large projects since 1995) having a multidimensional intention of: (i) introducing a system of multitier governance for forest; (ii) raising knowledge on the value of forests ecosystems and related services and capacities to ensure ecosystems-based management approaches; (iii) reviving a system of common pool resources management for forests based on inherited practices that have lost their importance during the centralised socio-political regime of 1945-1990, but remain vivid in the memory of local people; (iv) introducing the [sub]watershed as an appropriate physical space for organising forests management, with both principles of commons and ecosystem services combined.

However, as these intentions have been pushed mainly by donors (both financially and capacity-wise), their results are yet feeble and the struggle of the communities, forests associations and forests' federation to provide space for forest CPRs in the legislation is still going on. Donors have followed two distinct approaches to streamline a commons regime: (i) the first [65] established forests users associations as the hook to pull communities into shared management of forests. The strength is the existence of the associations to date and their role in promoting multitier polycentric forest governance. The weakness stands in their lack of capacities (financial and technical) to guarantee their sustainability and therefore carry out properly their role; (ii) the second was about working directly with forest appropriators (foresters and villagers), enabling them to properly engage with access, withdrawal, management and exclusion rights (the strength). The lack of alienation rights, vagueness in the law regarding CPRs, and local poverty hindered the sustainability of this approach (the weakness). State extension service was poorly run, so both approaches could not resonate with an official establishment of the CPR regime for forests in Albania. Nevertheless, the existence of the forest users associations and cases of the commonly managed forests, represent a very good starting point for the strengthening of the CPR regime, assuming that the legal framework will also be revised to accommodate it.

In both donors' approaches there was the intention to develop forest institutions and strengthen communities from a wide and integral livelihood perspective. The research on the previous intention is dealt mainly through a CPR lens, while in the latter through the sustainable livelihood approach – as an alternative to the single sector perspective

(Barnes et al., 2017). The World Bank initiative was very much concerned with establishing institutions (the CPR approach) and establishing the forest users associations, but did not manage to transfer enough knowledge to the communities, as to improve their livelihood in the long run. On the other hand, the USAID projects were focused on strengthening forest users knowledge by linking it to their livelihood (the SLA approach) and not necessarily to the establishment of community institutions (considered artificial when pushed externally). This led to some successful cases of forest management – due to knowledge given to the owners/users, but it did not succeed to establish independent self-sufficient community institutions for common forests.

The current regime of forest commons allows for appropriators to have access, withdrawal, management and exclusion rights. The appropriators can use the forest products, but not sell them. The appropriators and the municipal officials carry out together forest monitoring and cooperate in conflict resolution. The strength of this very genuine system is affected however recently from the forest moratorium law that has set a one-penalty sanctioning system instead of the previous graduate sanctioning.

The relationship between costs and benefits of forest governance is mainly defined by the legislation. However, physical and temporal boundaries play also a role in the case of commonly managed forests. Thus, due to insufficient monitoring and low enforcement of sanctions by the public authorities, the costs and benefits are not mutually proportional in overall, with those receiving licensed (short-term) rights bearing less costs and receiving higher benefits and vice versa for the municipalities. Costs and benefits are shared proportionally between shareholders within the commons' regime.

An authentic Albanian forest CPR regime is present and should be strengthened and have a healthy cooperation with the conventional forests management, as the way to guarantee ecosystem-based governance for forests. This requires in one hand that public institutions raise their capacities. The success or failure of government initiatives at natural resource management depends, among others on the level of support provided to local governments (Nagendra & Ostrom, 2012). In the other hand, communities should be given the official opportunity to engage in a commons' regime. However, measures to conserve natural resources are more likely to succeed if local communities are given

ownership of them, share the benefits and are involved in decisions (MA, 2005b). Some scholars presumed that unless users had alienation rights, they did not have any property rights. (Ostrom, 2009b). In fact, in Albania, users gain proprietary rights, but their strength and security is pretty questionable, as long as the acquiring of rights happens informally. Therefore, it is necessary to either reform the criteria for providing strong proprietary rights, or provide full ownership to villages for the so-called village/common forests. This undoubtedly requires for a substantial revision of the legislation, to accommodate a sound common's regime for forests.

The revision of the legislation should emphasize the use of the intrinsic approach in forest governance. Historical knowledge and practices of shared forest management are an asset in this regard. Stakeholders request for a strong common property regime to be in place, considering it more appropriate than a commons governance regime, because full common's ownership will: strengthen historical links and knowledge based on the 'pride' factor, leading to sustainable practices and hence providing ground to ecosystem-based governance for forests. This will further reinforce the effect of interventions aiming ES protection to community forest management, because the sense of full ownership is expected to make users be inclined towards learning how to use sustainably their resources; enhance the success of the shared management due to strong direct links between appropriators and resources; enhance security of users on the property. On the other hand, moving right away from a hybrid system to a full common ownership, one may risk the very purpose of the shift. Therefore, stakeholders propose for a gradual change to take place. As a first step, the moratorium needs to be revised to eliminate side/external effects and replace the one-penalty system with the graduated sanctioning one, next to enhanced monitoring. Then the common management of forest on village and historical ties basis should be settled in the law, followed by criteria that strengthen the system and sustainability of the proprietary rights. Municipalities should then promote people in the rural areas to self-organize for shared forest management and the government should provide [financial] incentives for commoners.

Finally, the social network of users associations should be strengthened as the intermediary layer between conventional governance institutions and community forest

institutions (or CPR institutions). This network will not only improve communication between the two governance models; it will smoothen the negative effects o scale mismatch; it will allow for integrated watershed management to incorporate sustainable [community] forest development and protection measures, including the necessary and working institutional arrangements; it will enable ES restoration, enhancement and protection measures to be implemented at both the small and the regional/larger scale that by definition is set to be the functional ecosystem scale; it will help knowledge, including scientific and technical one, on forest management to move across scales and user therefore resulting in increased scientific and technical knowledge of users at any level; and it will support communities to increase mutual trust as well be stronger in influencing national and regional policies and instruments for governing forests.

Epilogue

This is the first study of common pool resources in Albania and it confirms that in spite of how exogenous and endogenous factors embedded into socio-political regimes change over time, the commons are a long lasting and enduring socio-ecological construct. There are certain principles that commons' institutions display as features of sustainable systems. However, there are always place-specific ingredients that make a case successful or achievable. In Albania, tradition and cognitive development values, next to social innovation, community interventions and high group resiliency are the key factors that have and will guarantee in perpetuity the strong existence of the commons. Furthermore, these ingredients have pushed Albanian forest commons a step ahead into smoothening mismatches of boundaries and scales, and providing clues for how ecosystem-based management should and could be mainstreamed into forest governance, at any tier of a polycentric model.

This research is however focusing on forests – a specific natural resource, and it approached the study of boundaries and scales from a watershed perspective. For the case of Albania, it is insufficient to draw conclusions on the commons in general, without extending research to other common pool resources, to mention at least water and fisheries. From both, a national and international perspective, the conclusions on the river-basin approach are yet preliminary. There is a need to look at all ecosystems (as

commons) that a river basin encompasses and it is most necessary to study ecosystem services as commons within a river basin, with the latter as the natural boundaries of the ES commons. The research of larger-scale CPRs is yet young on an international level, with few cases explored and relatively small repository of evidence. There is a need to expand the comparative study of larger CPR to include other cases, making reference to the SESMAD approach.

The mapping of the ecosystem services should further be explored in two dimensions: mapping demand next to supply and materializing the findings on a policy and planning decision-making level. Complete scientific knowledge of the ecosystem functions and services, transferred in an absorbable form to the different tiers of a polycentric system of governance is necessary for enabling a well-functioning ecosystem-based governance of the natural resources.

Finally, further research needs to take place within the multitier polycentric and territorial governance domain. Governance is not a recipe – to be successful it requires the existence of "flexible and distributive institutional forms" (Armitage, 2008, p.25) with no physically set boundaries. It also requires strong government institutions that implement the stated policies and resist elite groups who pursue self-benefiting targets (Nagendra & Ostrom, 2012). The answers to these needs cannot be generated solely through governance and territorial studies. In-depth research should be considered that looks at the governance of resources, be those natural or human-made. The governance of the resources is complex as it involves the large array of socio-ecological interactions, and it provides fundamental insight on issues of resilience and sustainability.

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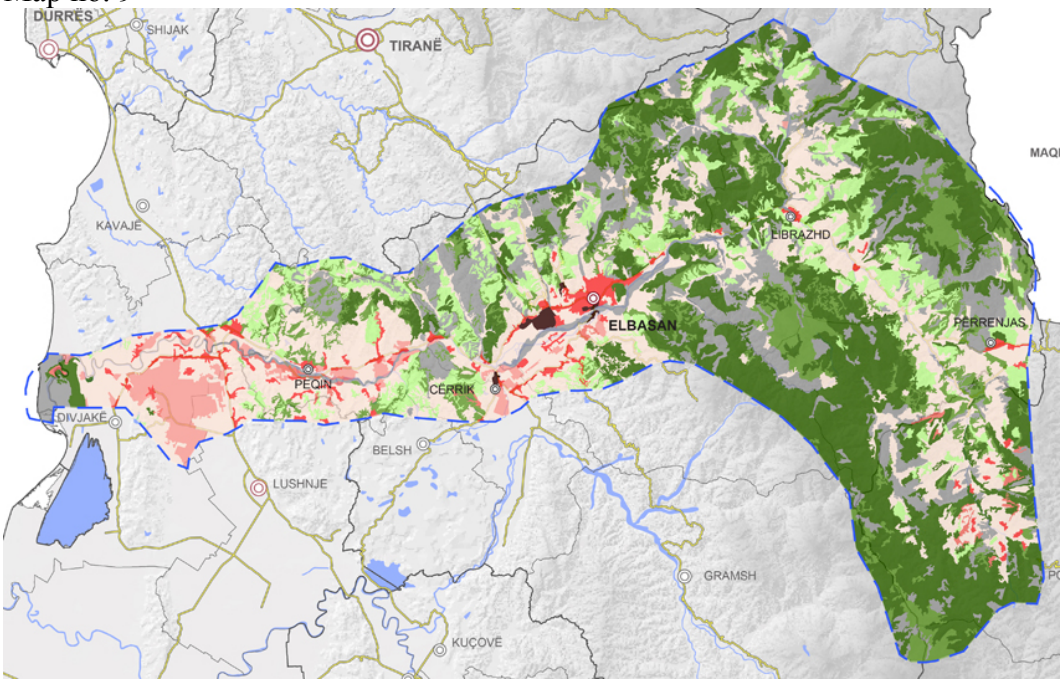
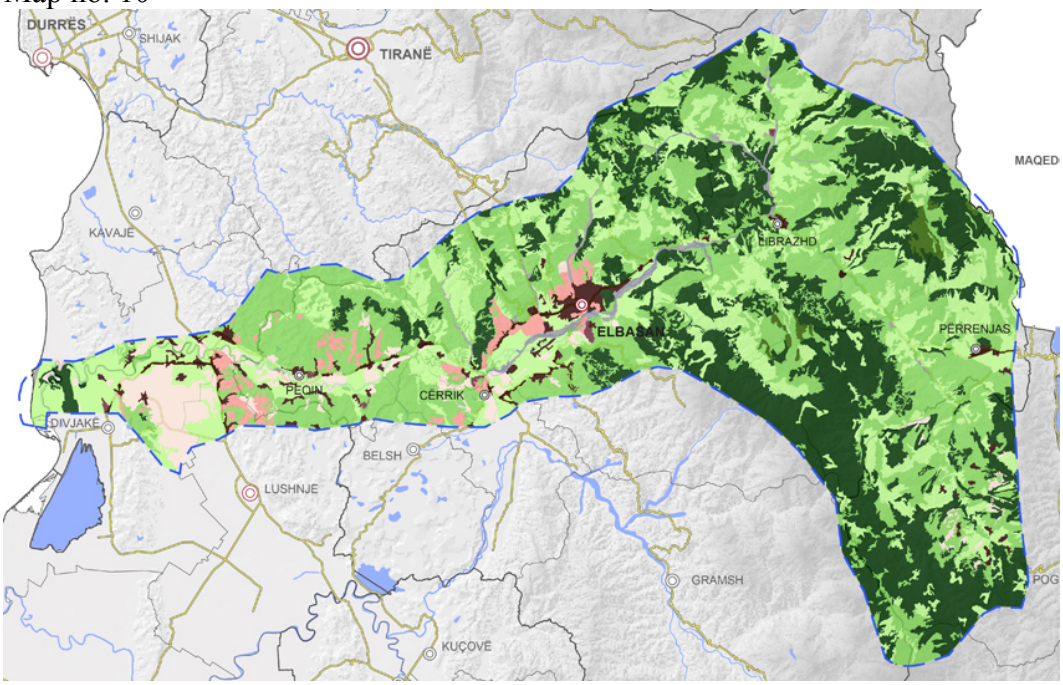
Annexes

Annex 1. Maps: The numbering of the maps coincides with the numbers of the ecosystem services in the ES supply-demand budgets matrix.

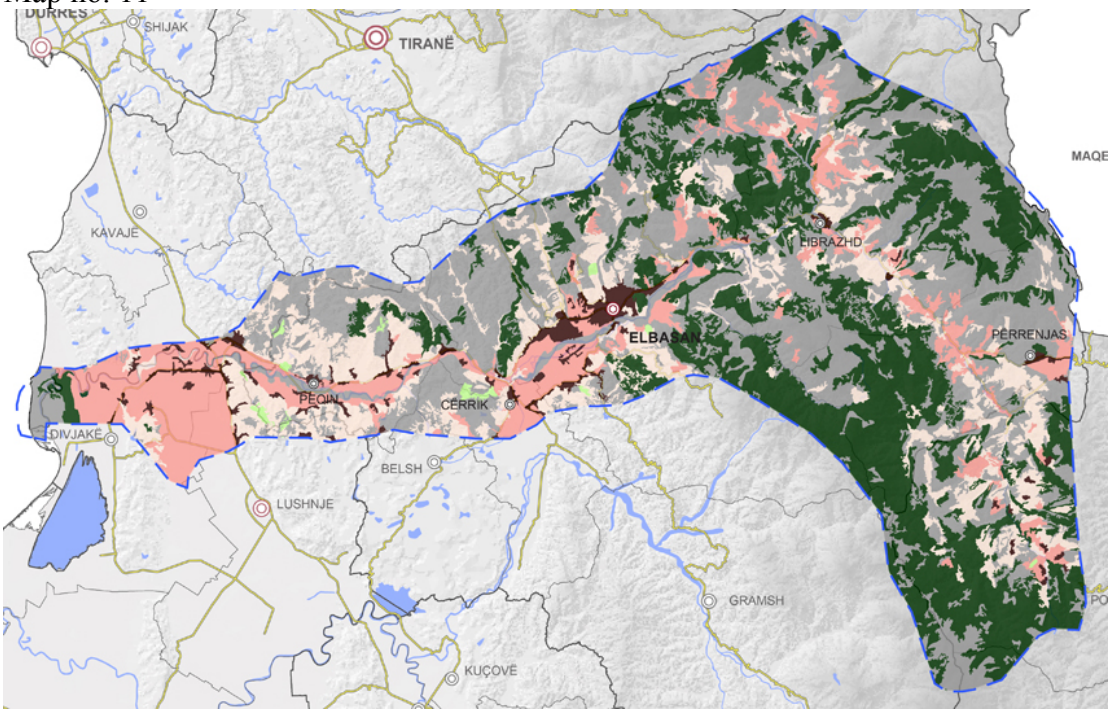
Map no. 9



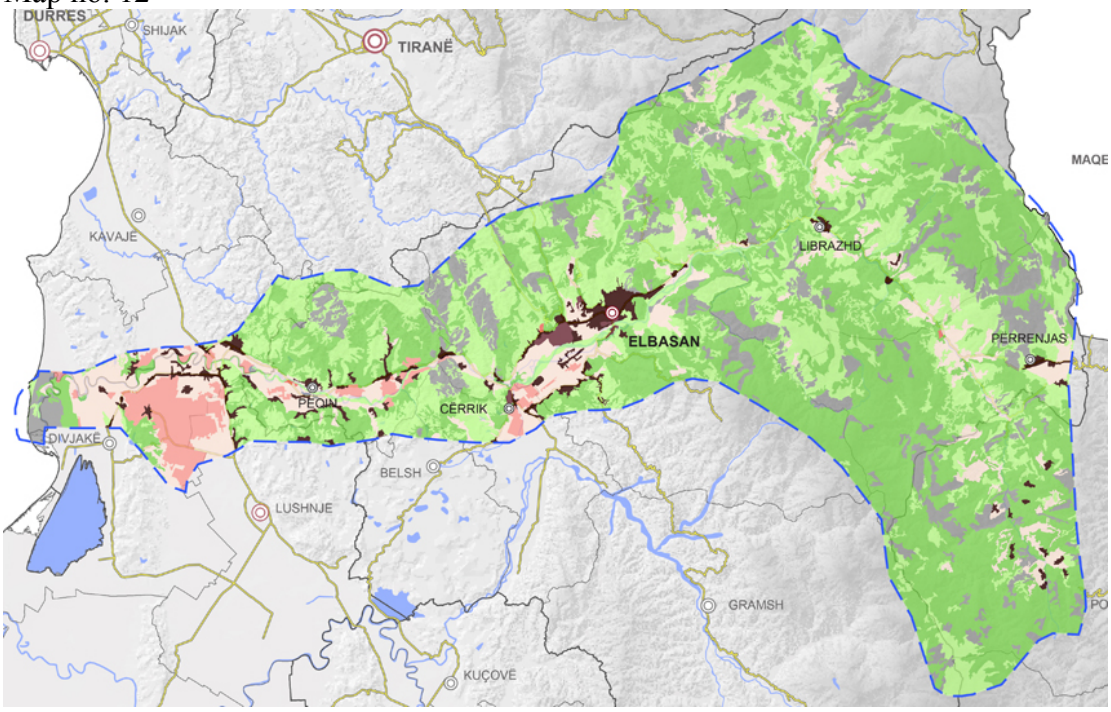
Map no. 10



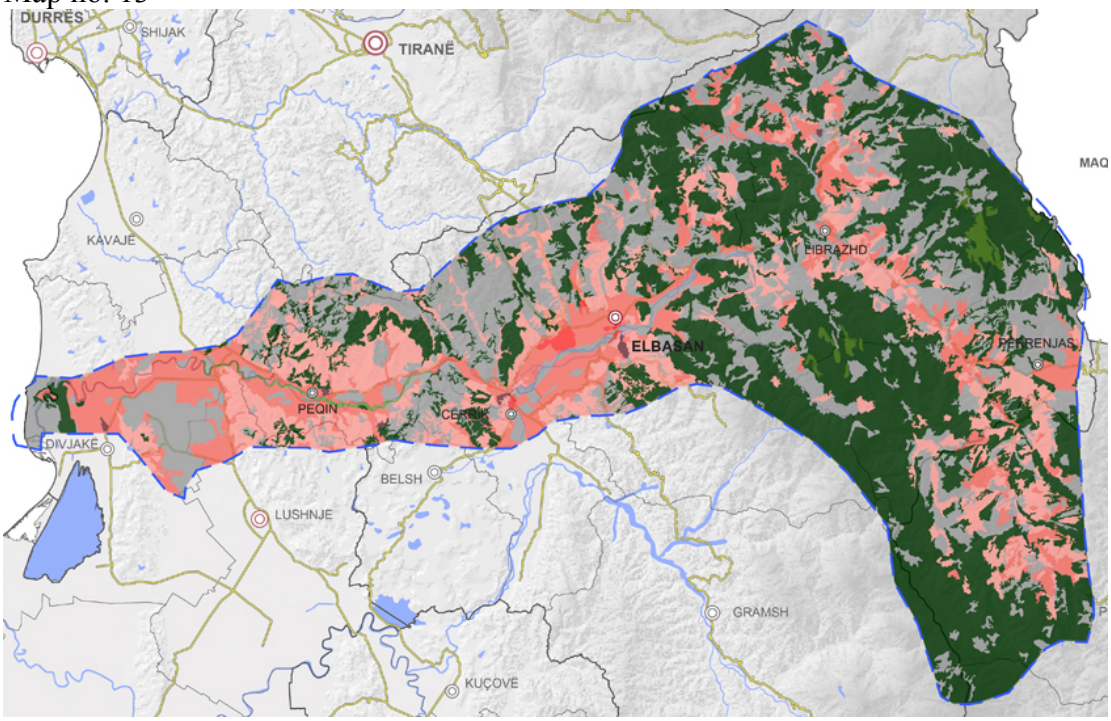
Map no. 11



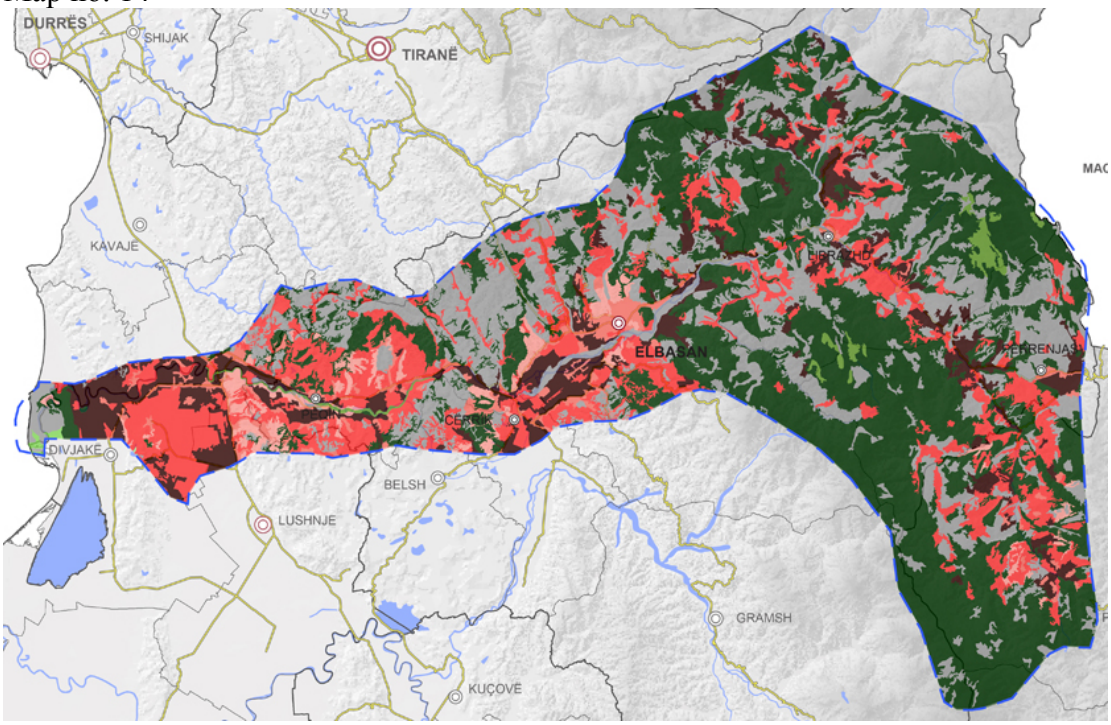
Map no. 12



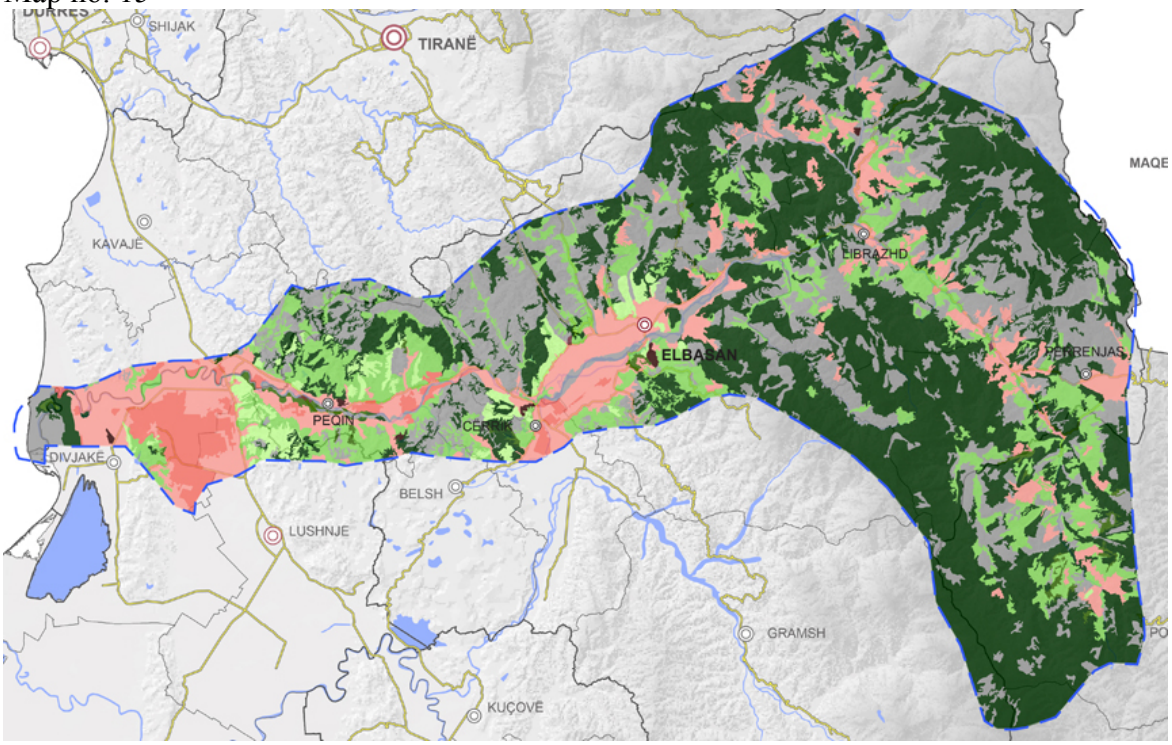
Map no. 13



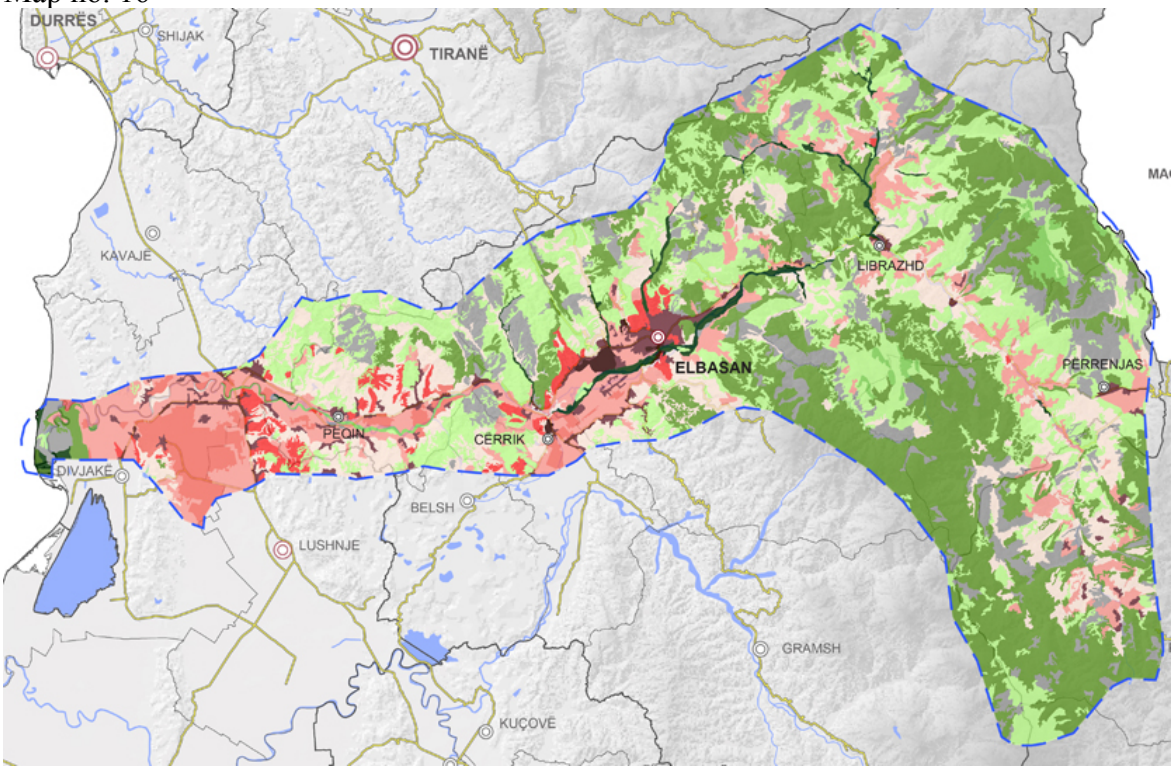
Map no. 14



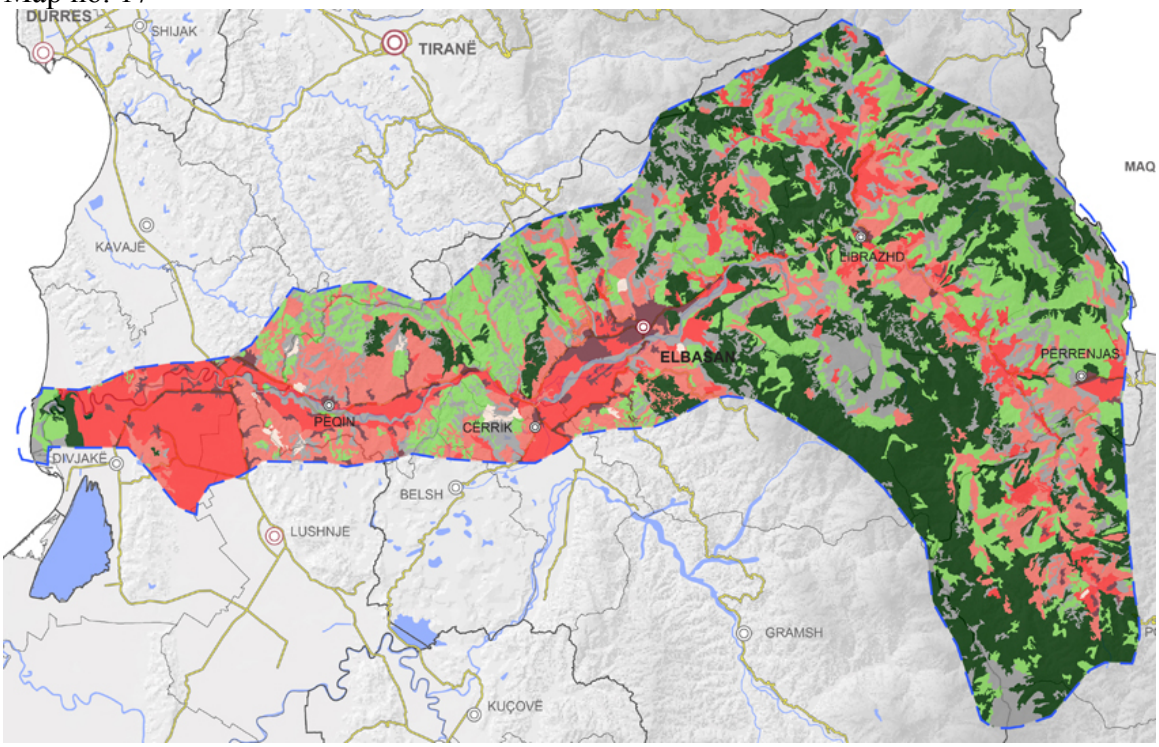
Map no. 15



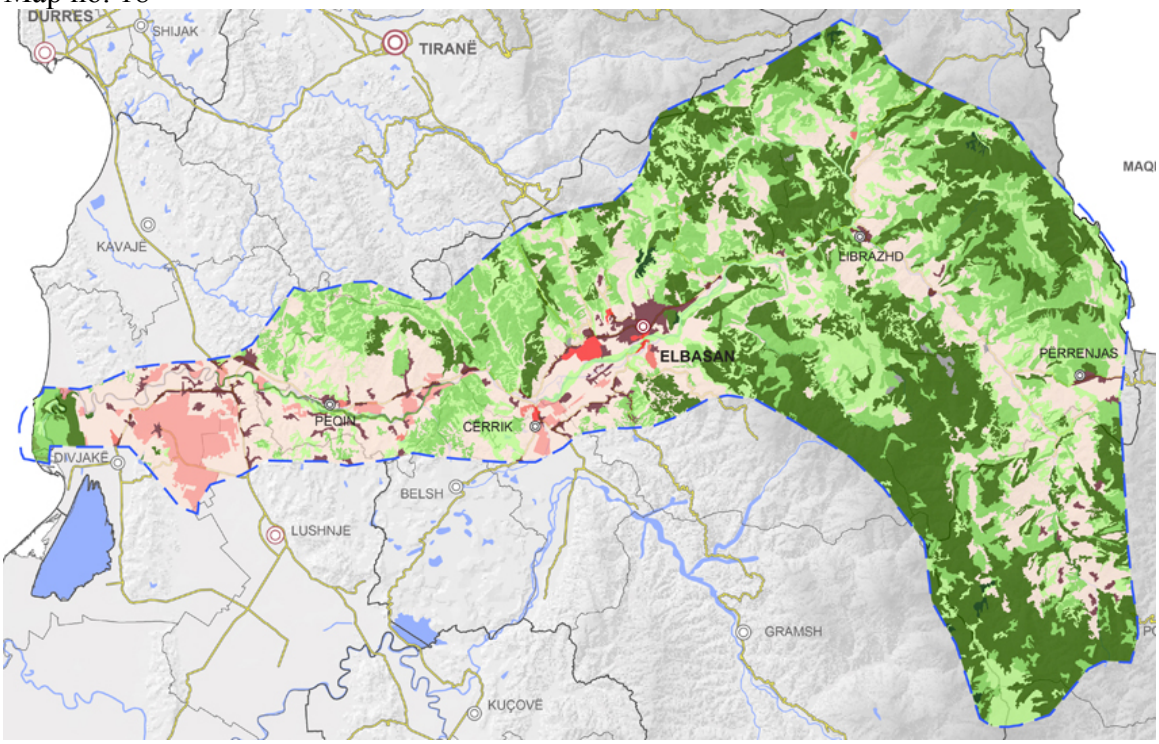
Map no. 16



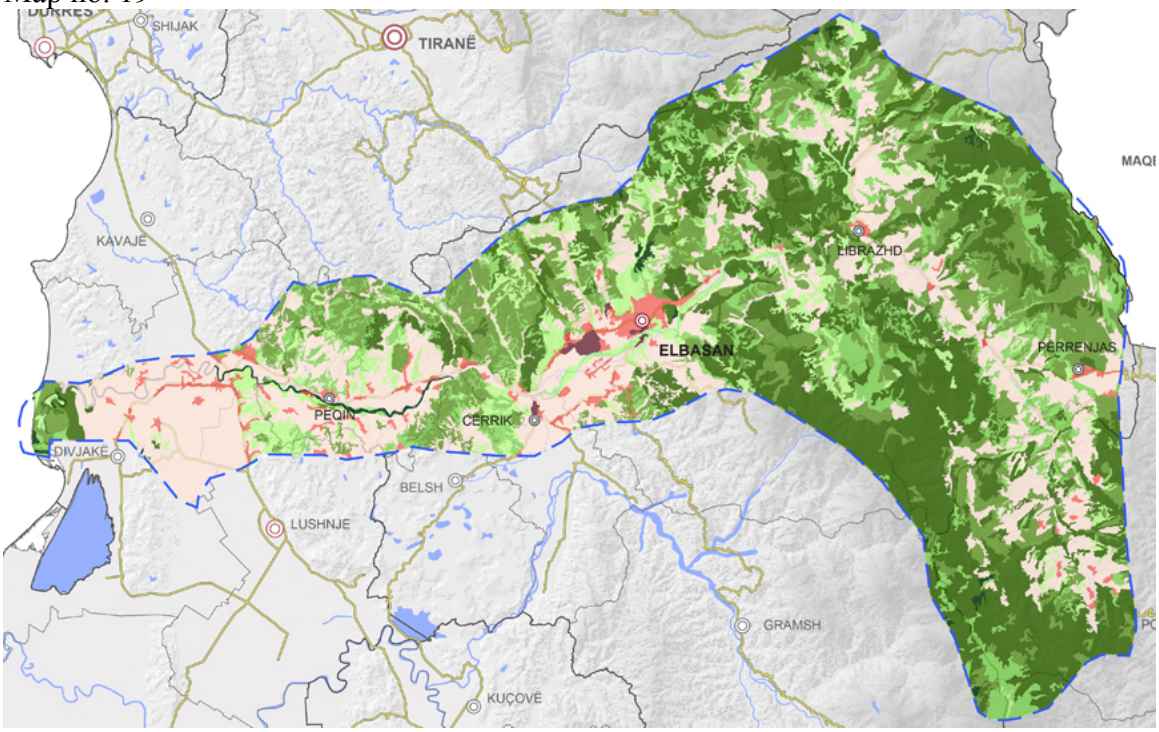
Map no. 17



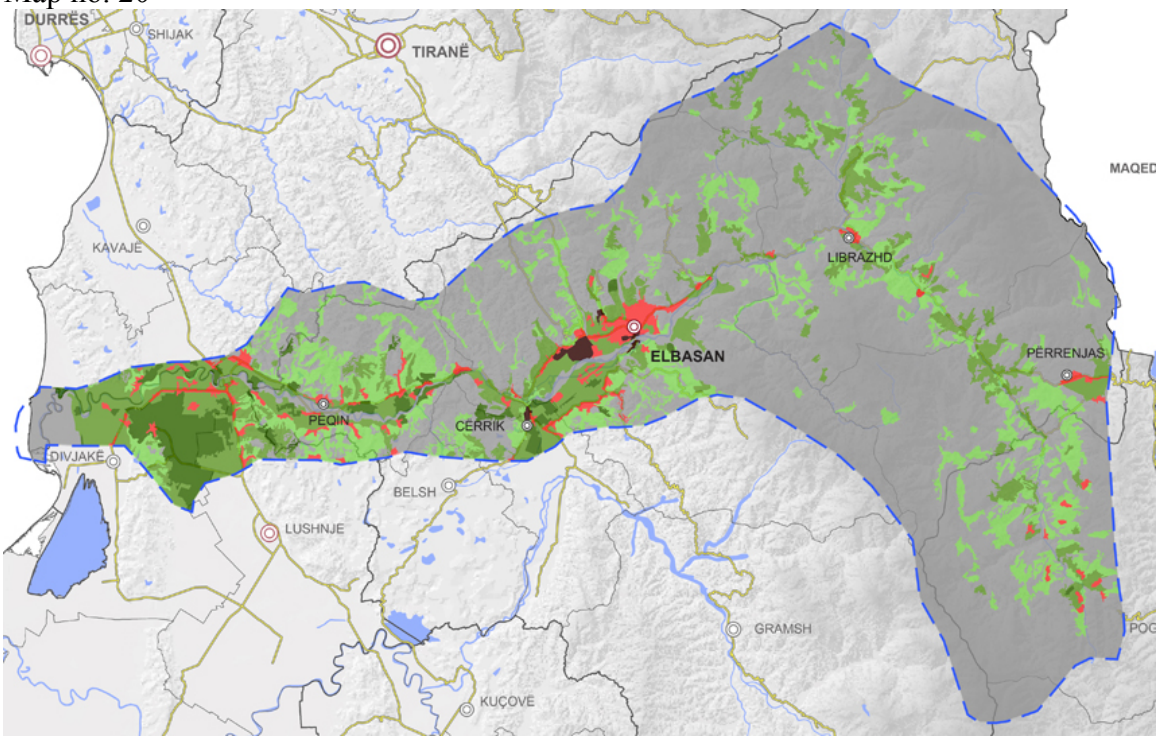
Map no. 18



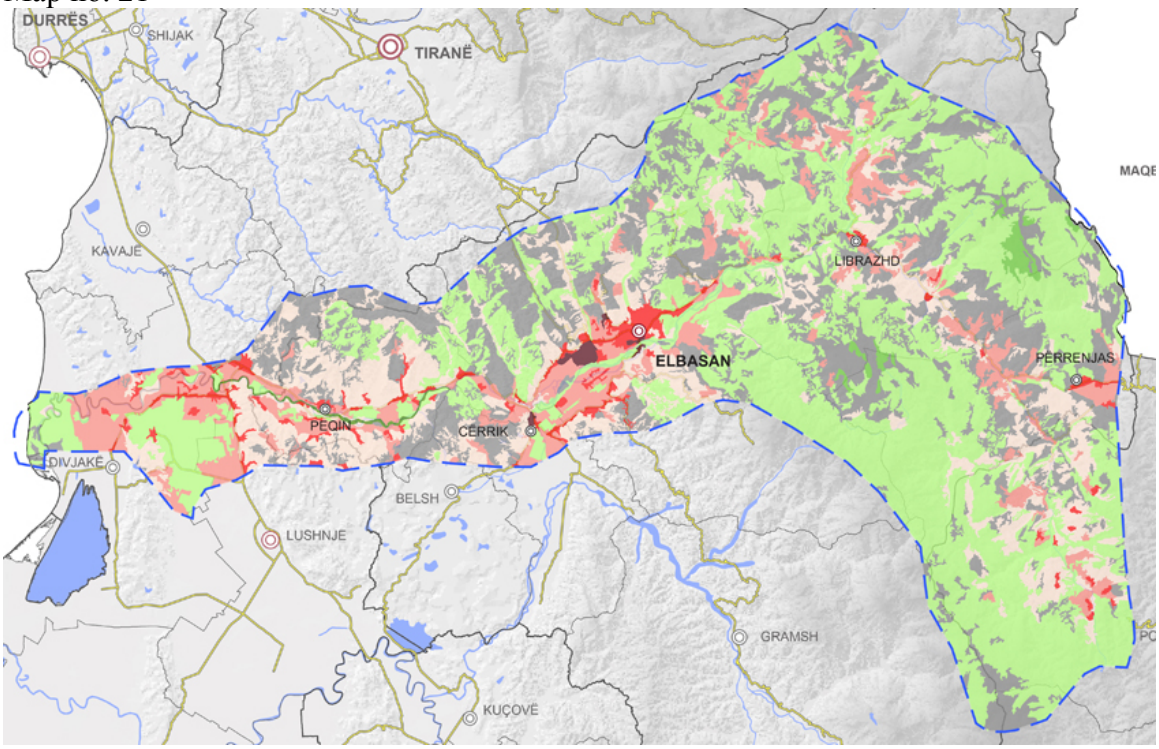
Map no. 19



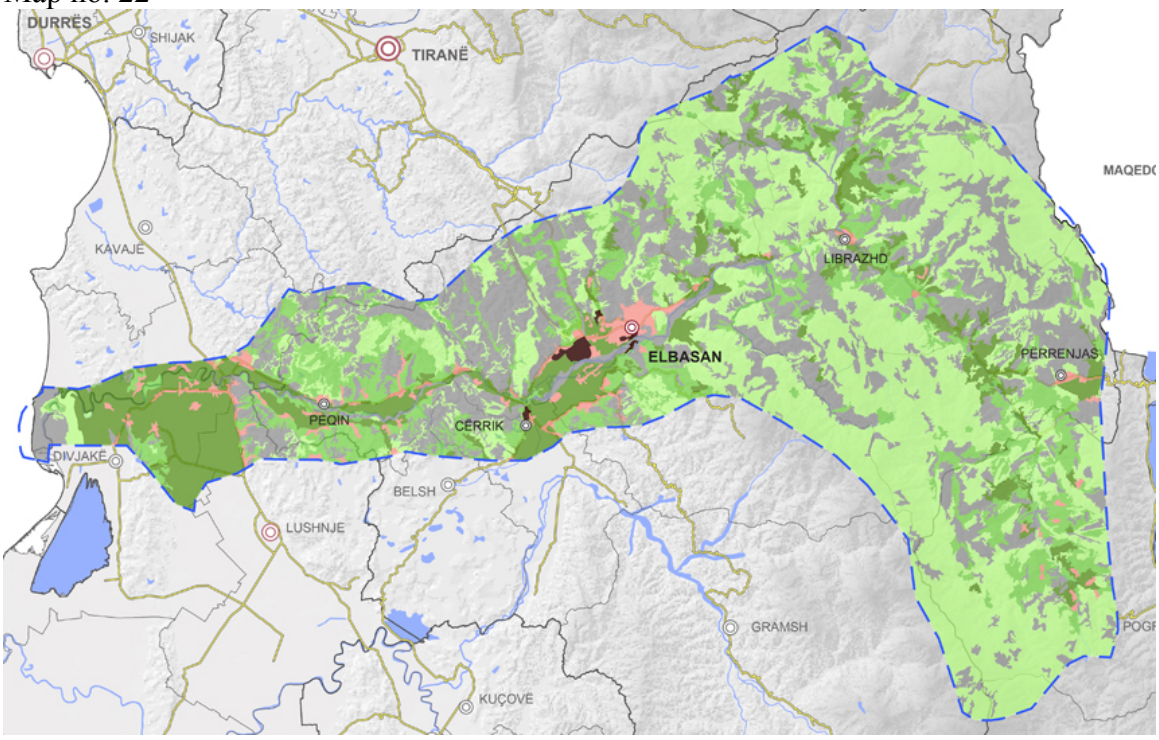
Map no. 20



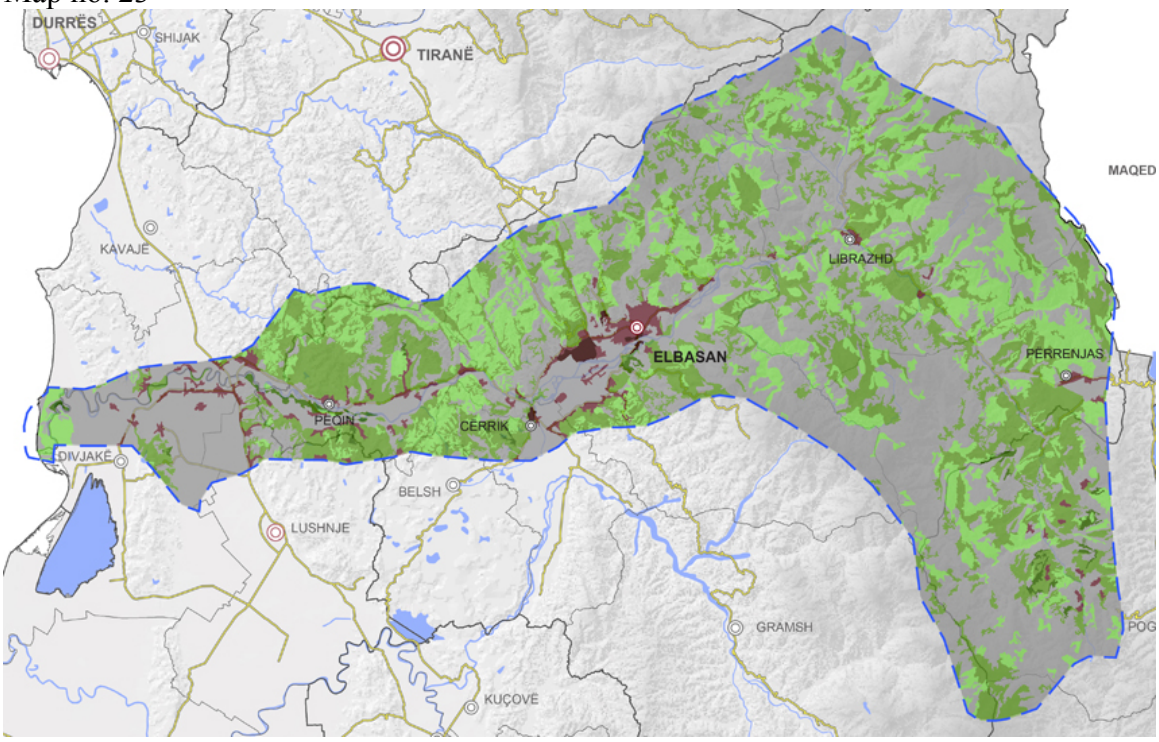
Map no. 21



Map no. 22



Map no. 23



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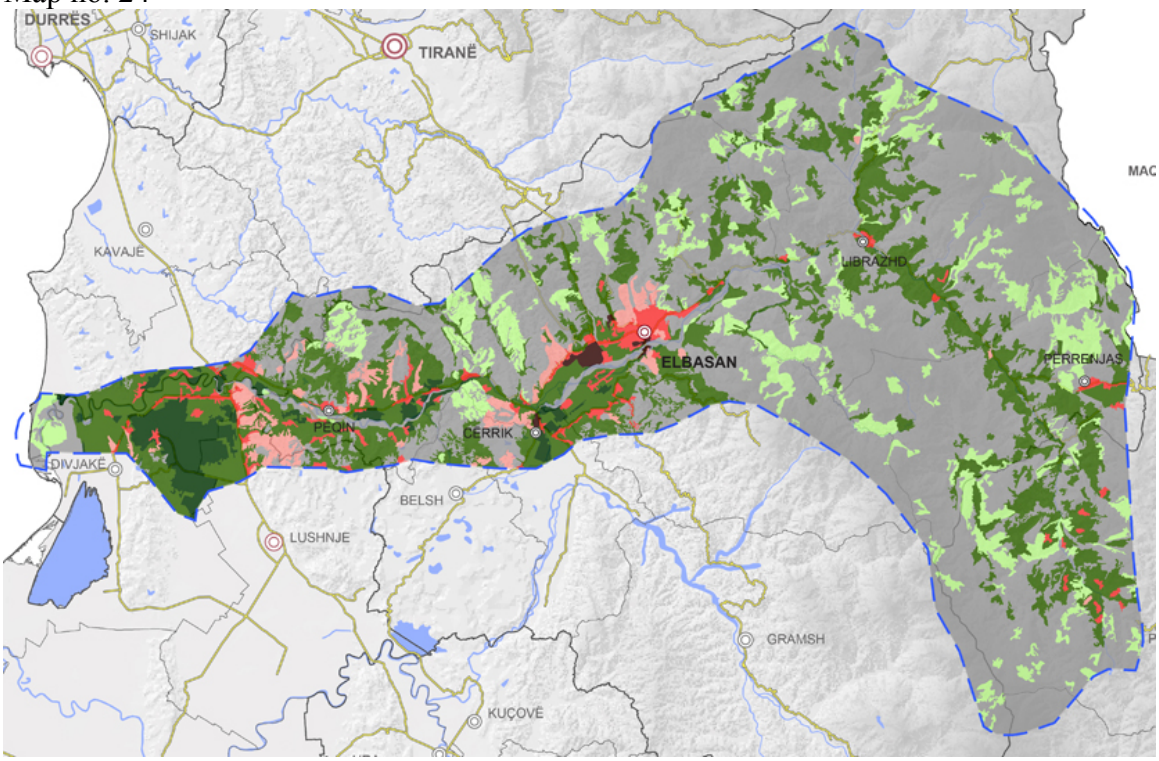

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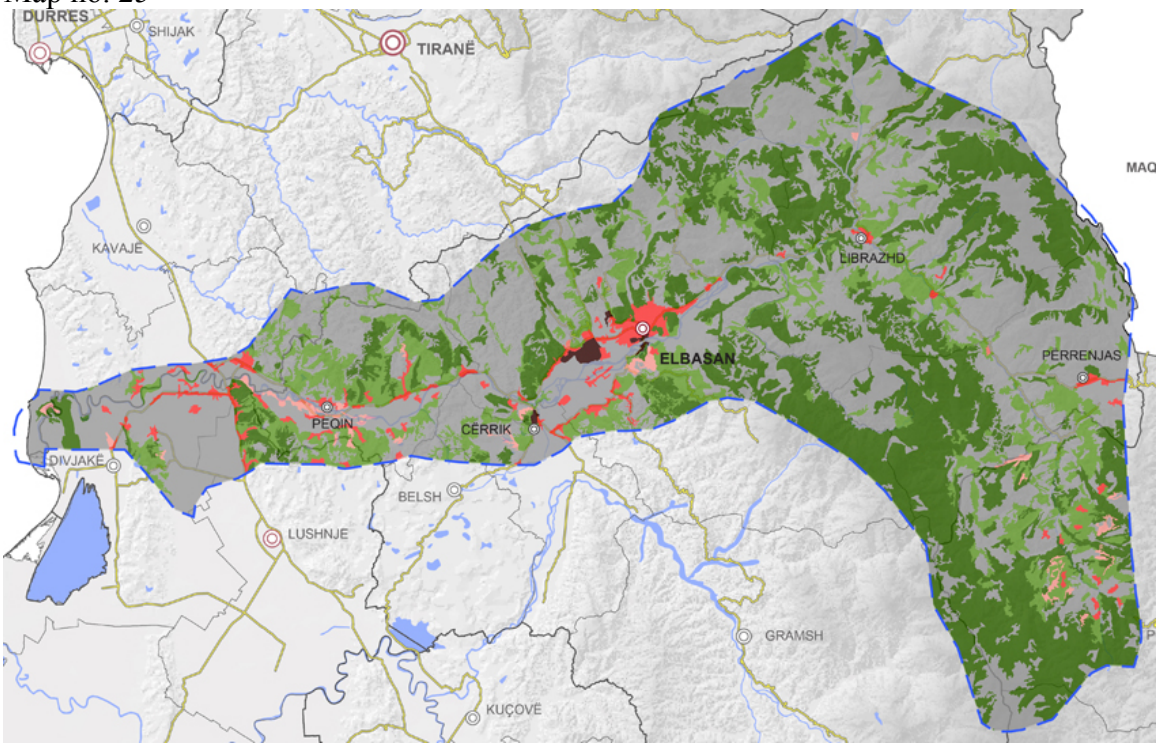

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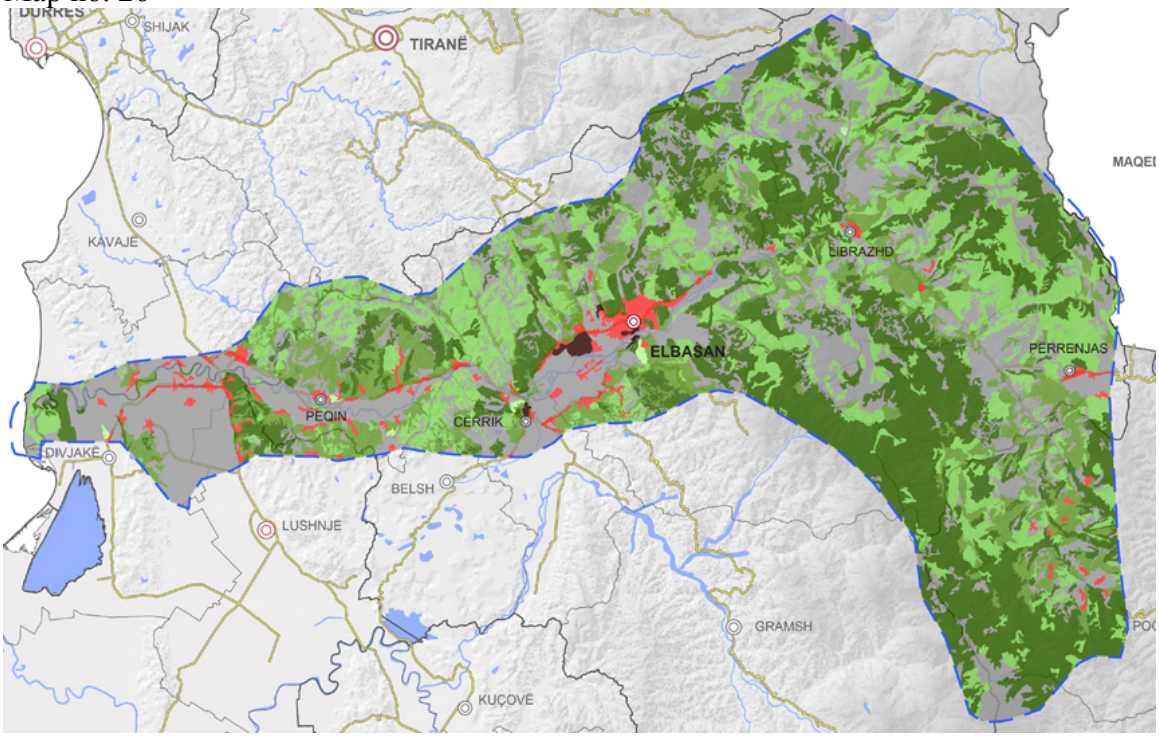

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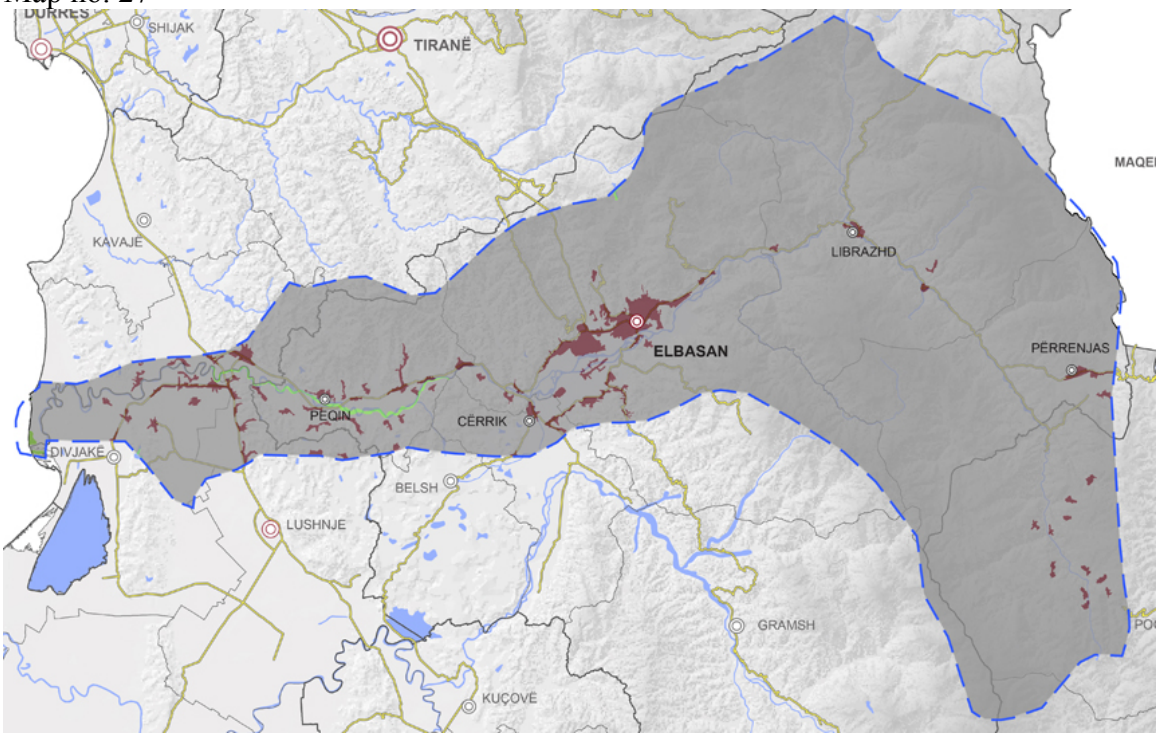

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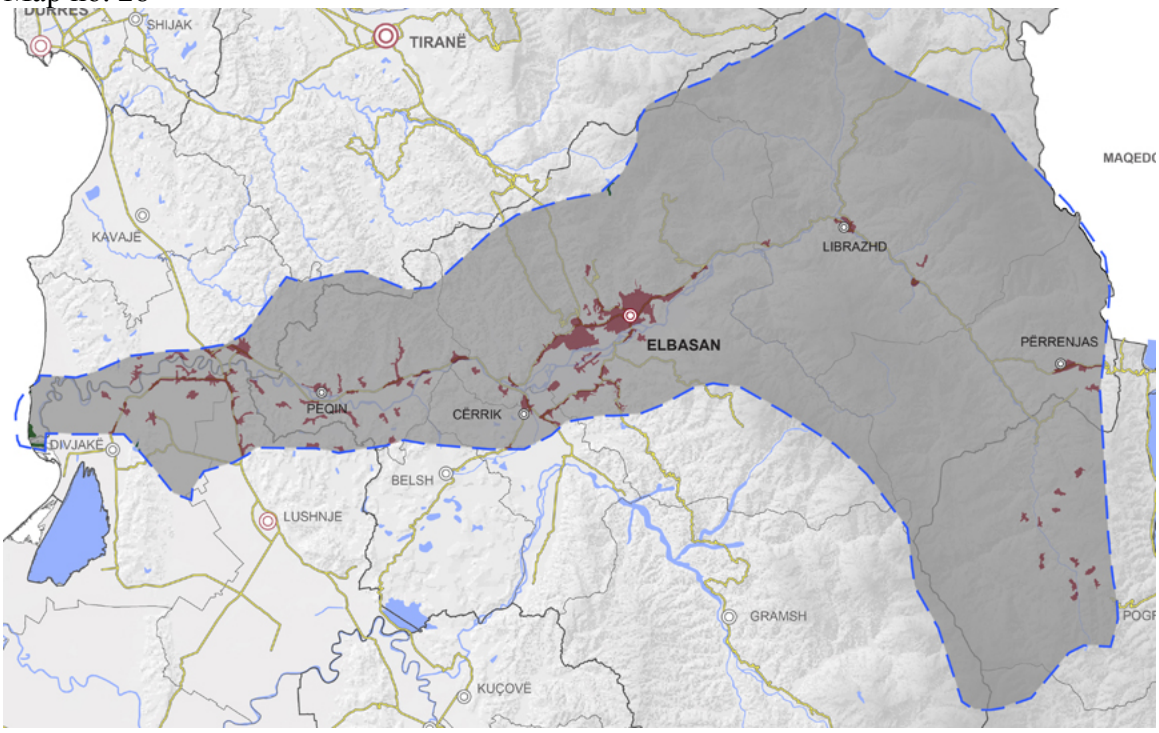

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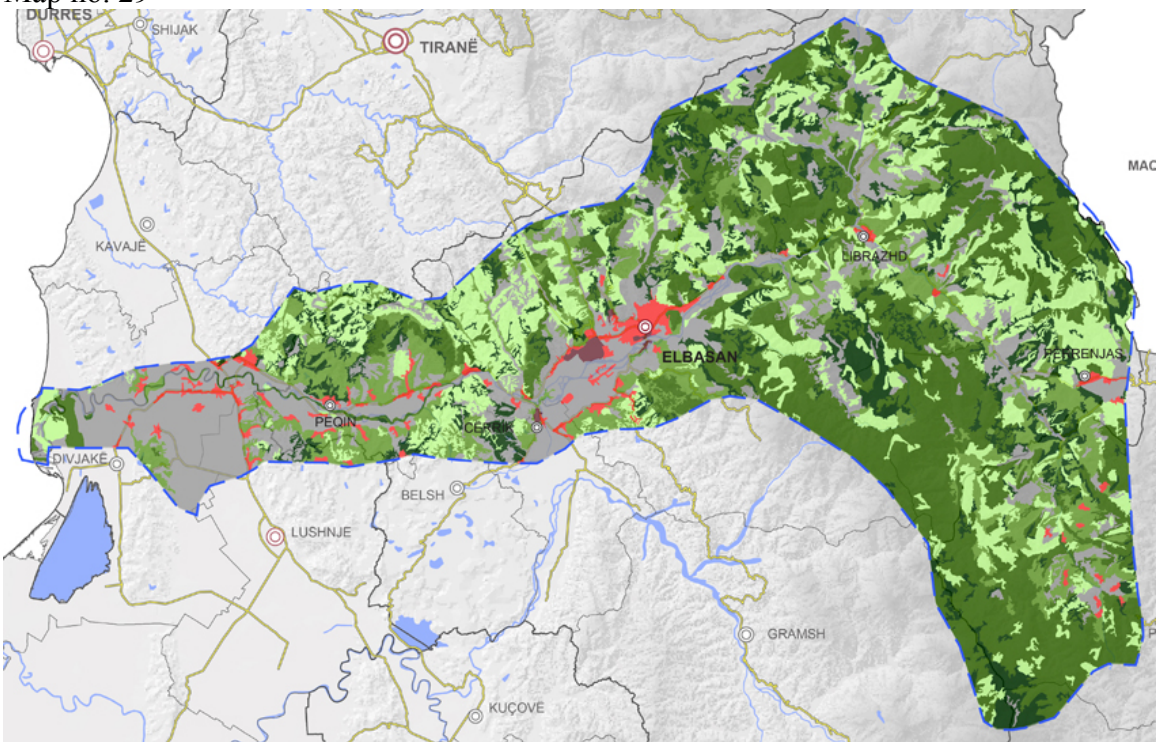

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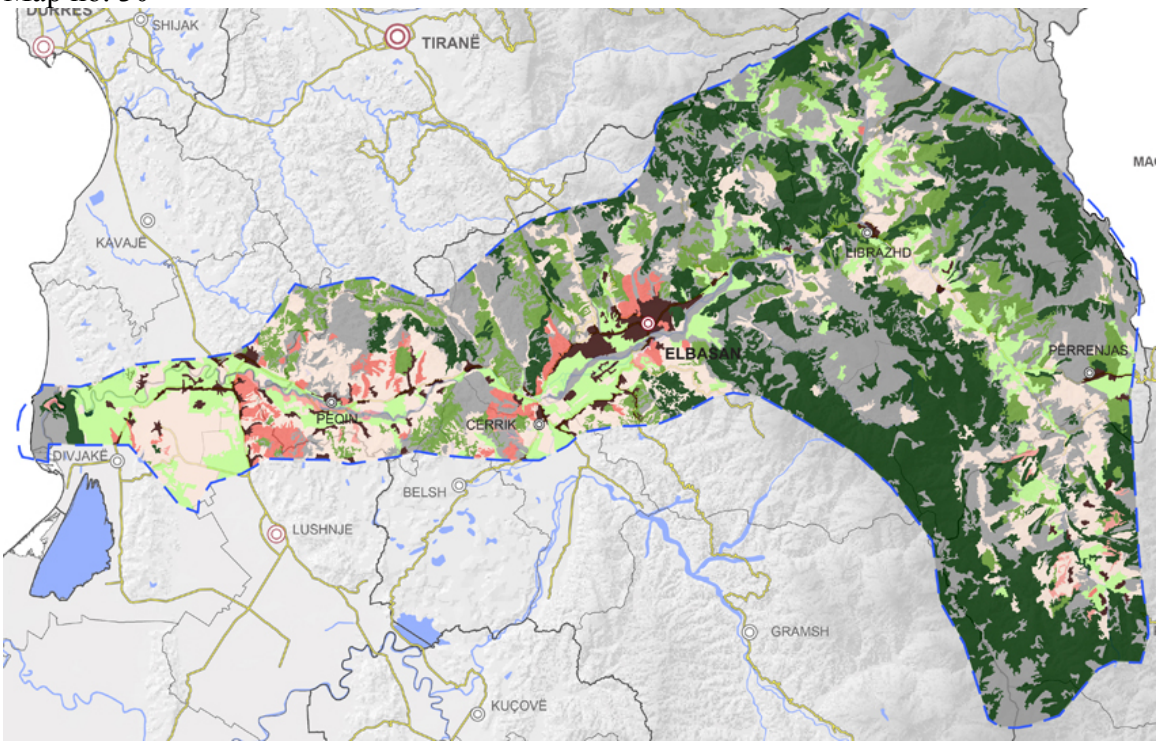

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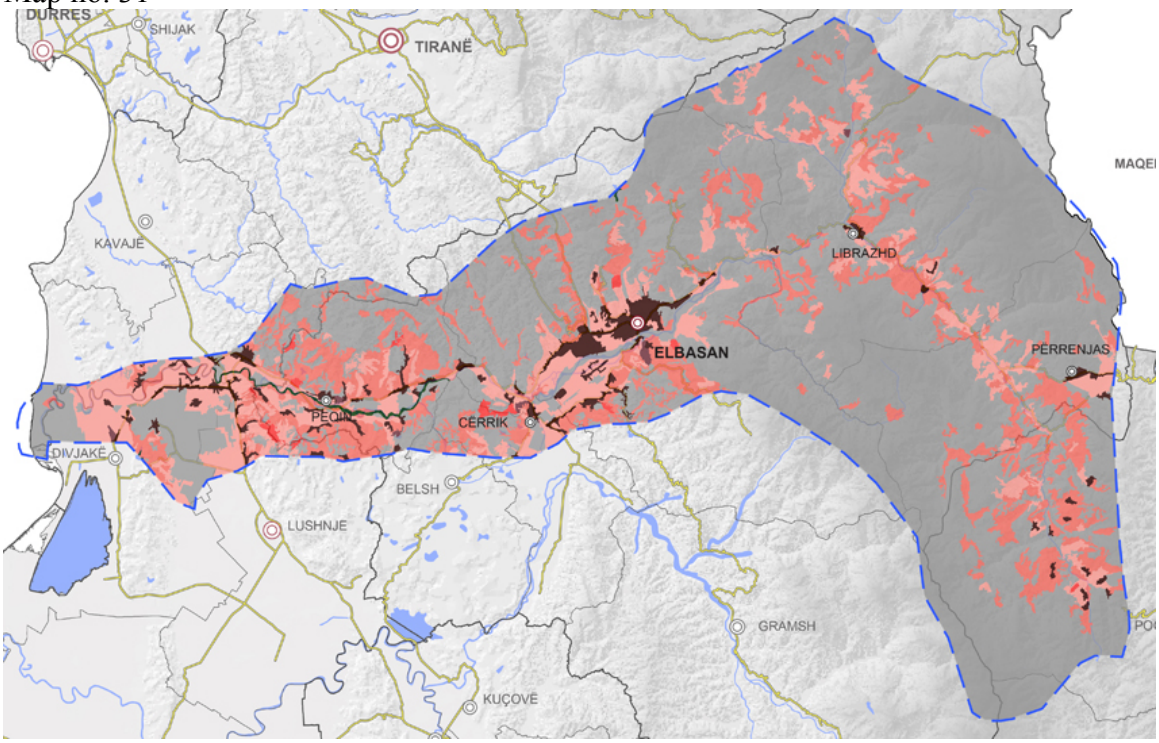

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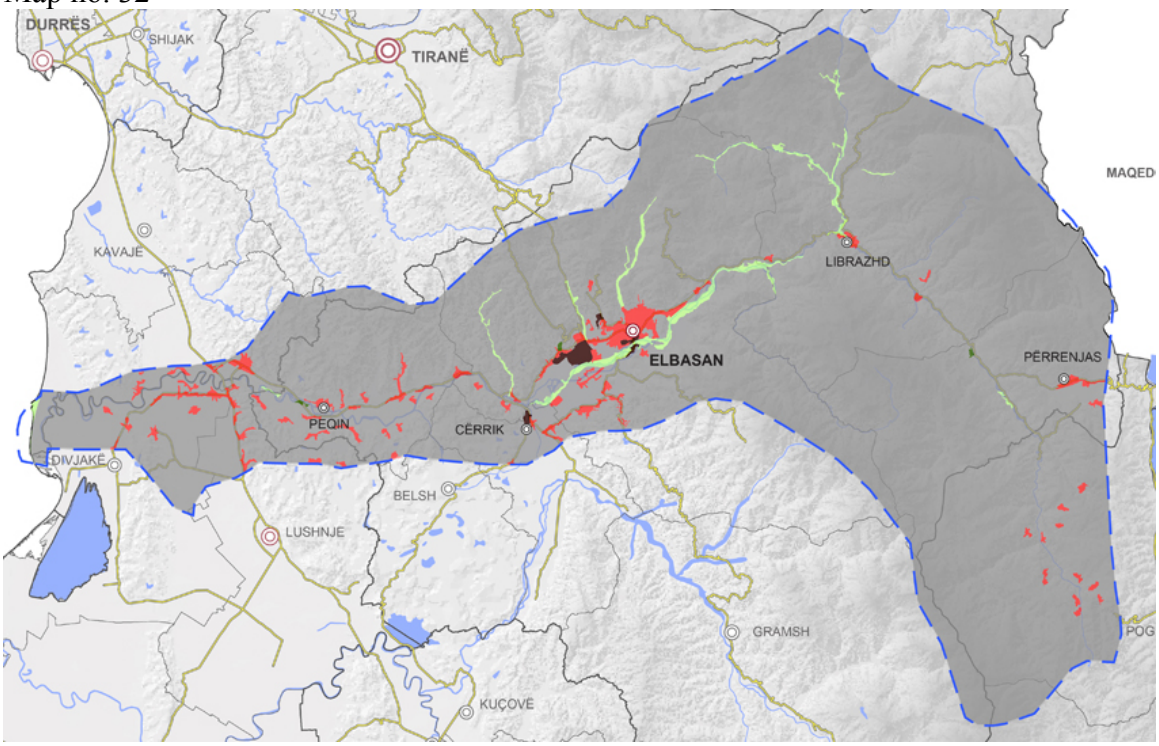

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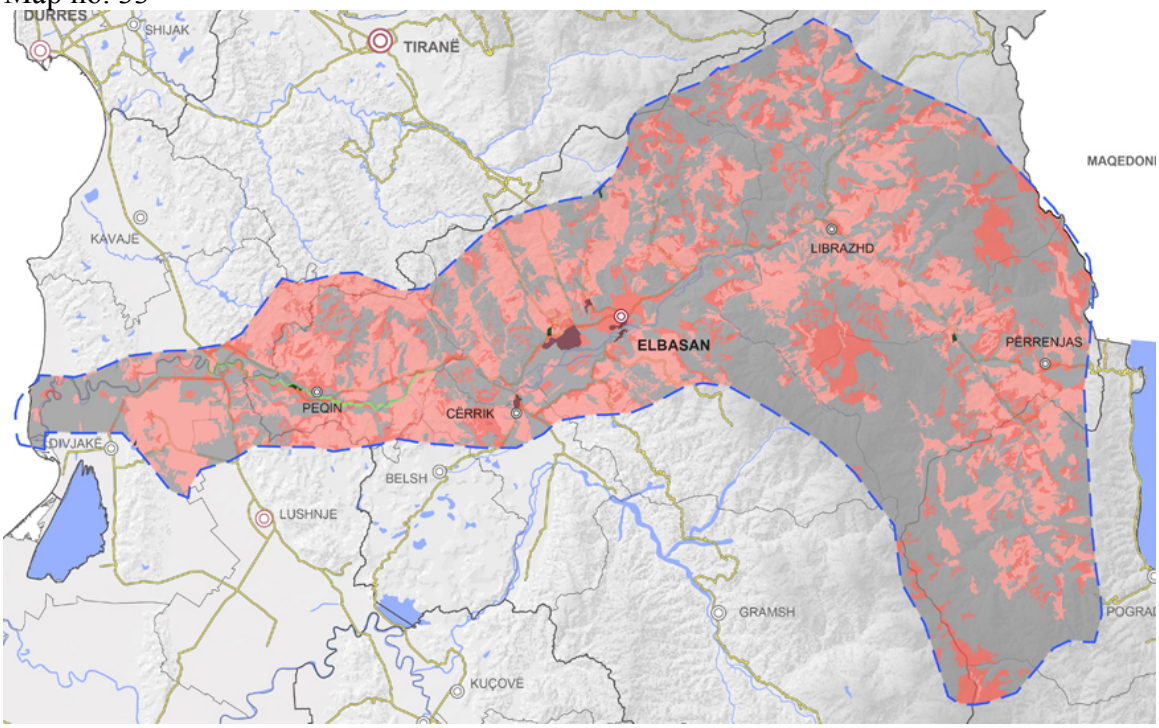

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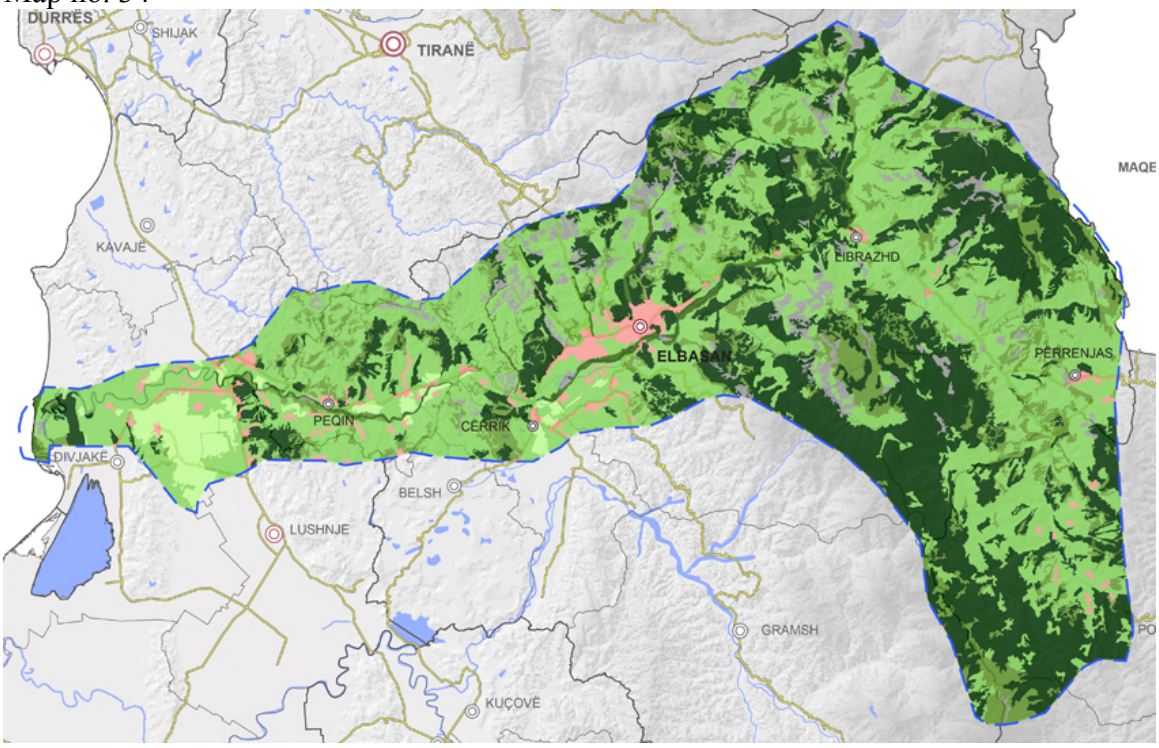

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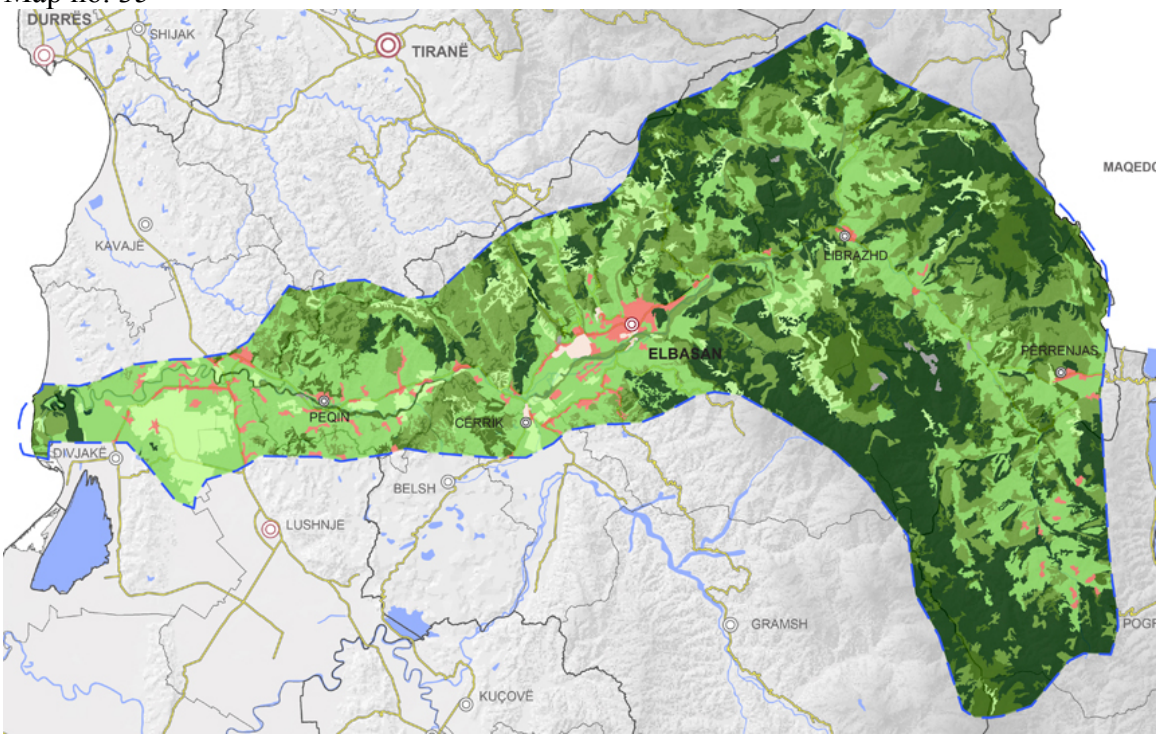

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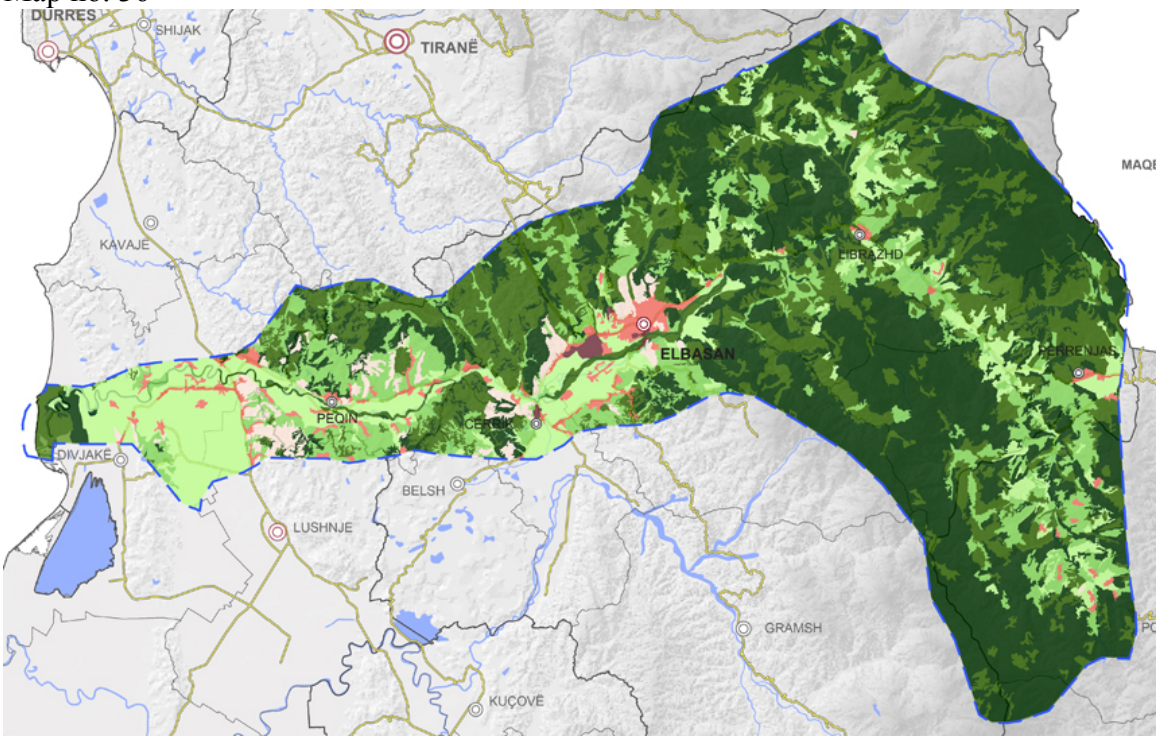

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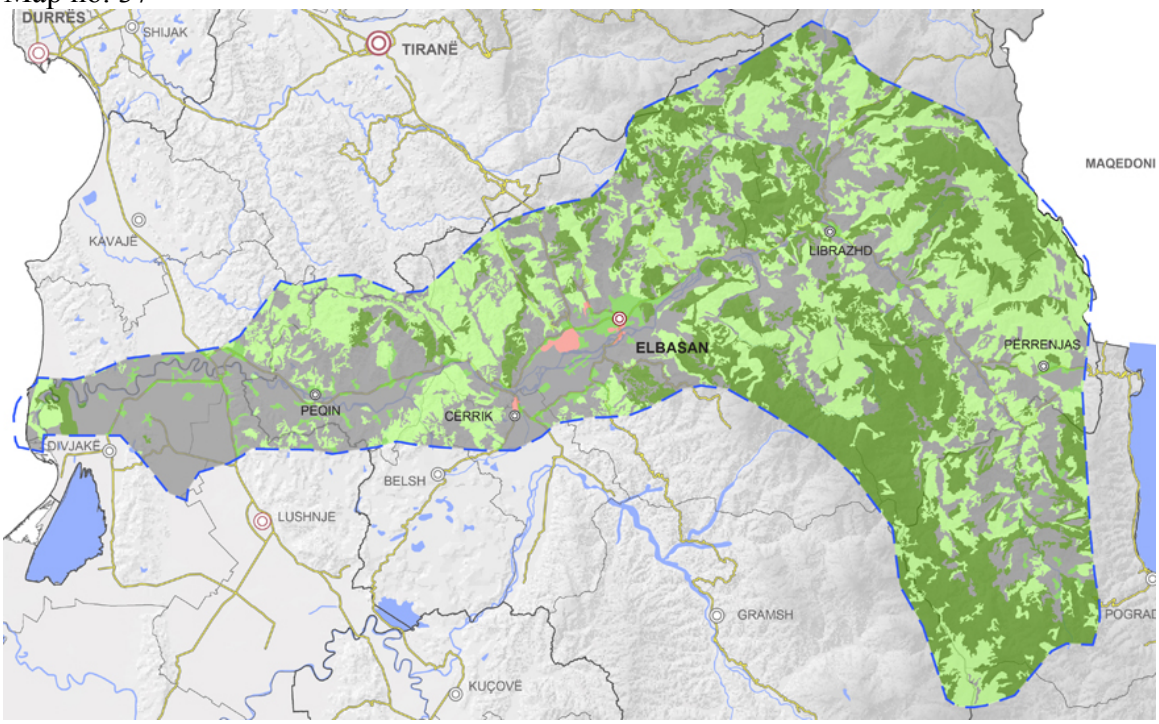

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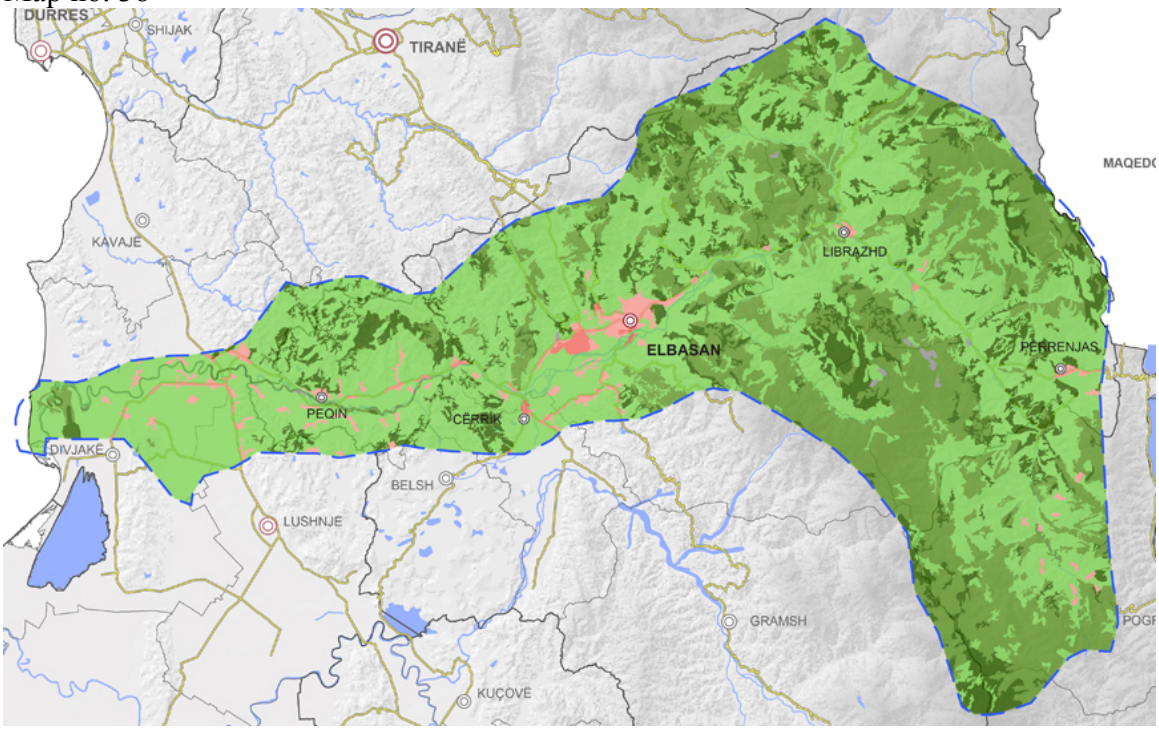

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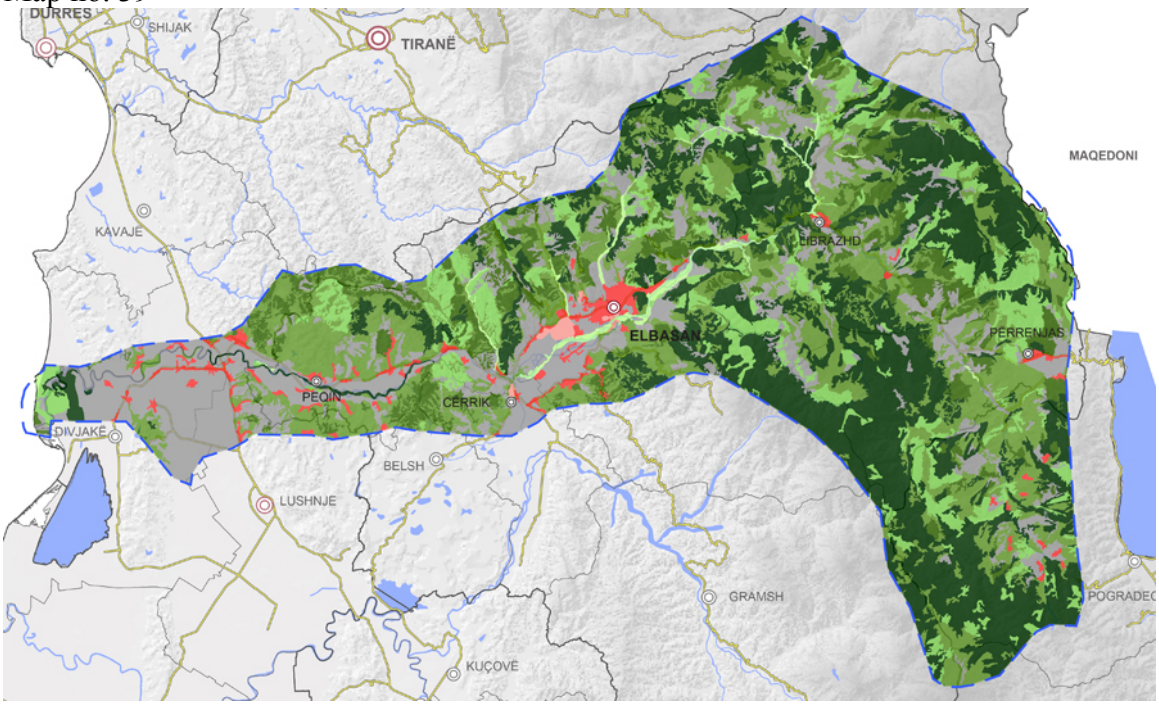

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- Border of Shkumbin Basin
- Rivers
- Lakes
- Main Roads
- Main Cities
- Secondary Cities
- Border of Qark
- Border of Municipalities

Annex 2. The format of the interviews (COST)

The following is developed by Tatiana Kluvankova and Veronika Gezik, 2016, based on Elinor Ostrom 8 design principles for robust commons institutions, and used under the CLIMO action of COST.

Typology of Forest Commons in Europe

Following findings from country reports, objective of **Task group on typology of commons** is to search for information on how forest ownership types and regimes determine motives for resource use. In particular **we argue that robust common pool resources regimes (CPRs) in European forest are critical for sustainable forest Management.** Driven on Ostrom's (1990, 2009) 8 design principles of robust management proper rules on management (harvesting, decision making and conflict resolution mechanism, cost/benefit sharing, sanctioning etc.) are key for sustainable use of forest resources. The insight that there is a manifold of different CPRs regimes within our COST Action can provide valuable knowledge for cross-country comparison and (potentially) policy recommendations. **Thus in this report it is important to concentrate on TRADITIONAL, NEW commons as well as CPR regimes with USERS RIGHTS only.**

Please answer the questions bellow, for following forest ownership categories (if exist): traditional commons, new commons, cooperatives, community (indigenous) forests, and municipal forests.

1. HOW ARE USERS RIGHTS DEFINED AND PRACTICED?

1.1. Please specify type of rights that users/forest owners can use in your forest regime: You can choose multiple options. (Small-scale forestry). This question is important to determine type of rights users/owners can explore in their forest affecting character and robustness of CPR:

Access:

(The right to enter the forest while do not subtract from benefits that others can enjoy, such as hiking in the forest, such as hiking in the forest. Authorized viewers have access rights, such as those that are purchased with entry fees as national parks.)

Withdrawal:

(The right to withdraw the product of forest property, such as harvesting. Authorized users have both access and withdrawal right, such as those that are acquired firewood gathering permit from a forest) – authorized users

Management:

In addition to access and withdrawal rights to have a right to regulate forest use and implement improvements – Such as building fences, but also investment.

Exclusion:

(The right to determine who has access and who can be excluded from using the property, Proprietor holds access, withdrawal, and management and exclusion rights. – proprietors)

Alienation:

(The right to sell or lease – for any open area of grassy or arable land, any rights above).

1.2. Are appropriation and provision rules derived from historical practices? If yes, please specify

1.3. If not historical how and why (what were the key motivations) did users group started?

1.4. Is membership: compulsory? Free entrance/free exit? Specify origin of ownership inherited-bought? Does ideal share apply? Is it possible to sell rights? if yes does it require agreement of other shareholders? Have you recognized growing number of urban owners (members-share-holders moving outside the community)?

2. HOW CAN WE IMPROVE THE RELATIONSHIP BETWEEN THE BENEFITS RECEIVED AND THE CONTRIBUTIONS TO THE NECESSARY COSTS OF SUSTAINING THIS SYSTEM?

2.1 Is forest regime-entity self-financed or depended on external donors?

2.2 Who develop management rules and are these reflecting local circumstances? (Such as ecological quality of the resources, climate, local culture. and present economic interests?)

2.3 Are cost benefits of shareholders balanced proportionally to the size of the resource (share?).

2.4 Is management profit/non-profit oriented? (What is way to use the profit deriving from forest management activities?)

3. HOW DECISIONS ON FOREST USE ARE TAKEN AND WHO IS INVOLVED?

3.1 Who represent forest community formally? (President, statutory, assembly, management board other?)

3.2 Are individual or collective users participating on decision making? – if yes what are key mechanism and do these fits local and ecosystems needs?

3.3 How internal decision-making rules function? One member (household)/ one vote (or in proportion to the land extension, value of the shares, etc.)?

3.4 Who has rights to change the use of land?

4. WHO IS MONITORING HARVESTING RULES AND DO THEY FACE APPROPRIATE INCENTIVES GIVEN THE CHALLENGE OF MONITORING?

BY governmental regulations? Or/and Self-organised regimes and their own monitoring systems? (Please provide details if it exists).

5. ARE THERE ANY SANCTIONS FOR VIOLATING HARVESTING RULES PRACTICES? (Are those central – top down, or local – bottom up? (Self-sanctioning internal to community please specify details). Is it principle of graduate sanctioning applied (sanctions increases with recidivity of breaking rules)?

6. WHAT LOCAL AND REGIONAL MECHANISMS EXIST TO RESOLVE CONFLICTS ARISING OVER THE USE OF A RESOURCE?

6.1 To minimize conflicts between users? - Top down or local (self-organised)?

6.2 What are the costs of those mechanisms to individuals and society (or who takes those costs in terms of money but also time invested - wasted)?

6.3 What is the role of external public bodies in conflict mitigation?

7. HOW IS FOREST REGIME ACCEPTED – RECOGNIZED BY GOVERNMENT OR ANY CENTRAL BODY?

7.1 Are there functional and creative efforts by local appropriators to create effective stewardship mechanisms for local resources that should be recognized? Such as are internal rules in use (harvesting, renewal or sanctioning) accepted by authorities?

7.2 What is juridical status of forest considered for use as CPR regime? (cooperative, NGO-association, shareholders' company, leased, use agreement, foundation, other: specify please)

8. HOW ARE EXISTED FOREST REGIMES INTEGRATED IN NATIONAL FOREST MANAGEMENT SYSTEM?

Such as by by-law, policies, local networks or polycentric organisation or any other instruments?

Annex 3. The table of variables based on SESMAD

Table 9. Variables importance based on SESMAD

No.	SESMAD variables	Component Type	Importance	Question	Unit
9	Dependence on the Resource (economic dependence)	Actor	This variable forms the crux of many explanations about the sustainable use of natural resources (Agrawal, 2003). Most models of CPR systems account for resource dependence within the model as a core condition for resource sustainability and resource replenishment. Ostrom (2007) notes that collective action is facilitated when resource users are dependent on a resource for a major portion of their livelihood. Studies of social movements also show that marginalized communities are often motivated to act collectively to defend resources on which they depend for their livelihood (Martinez-Alier 2002). On the other hand, the literature that emphasizes commons user vulnerability (Adger 2000; Cinner et al. 2012) argue that dependence on a single resource can make users more sensitive, and thus less adaptable, to variations and disturbances in the social-ecological systems. This presents a basic trade-off in social-ecological systems. This dynamic may not apply to groups that are dependent on pollution-based commons.	How dependent are the members of the group on this commons for their economic well-being?	1 Not dependent or Slightly dependent, 2 Moderately dependent, 3 Very dependent
10	(Actor) Group size	Actor	"The size of groups has been a major variable in the collective action literature since Olson (1965), who argued that increased group size would decrease the likelihood of collective action mainly because of a free-rider problem: (1) individual contributions would not have a perceived impact, and (2) individuals could not be punished for not contributing. As group size decreases, it is plausible to think that interactions between users increase, which consequently increases the importance of reputation in the group and facilitates monitoring (Poteete and Ostrom 2004b). Empirical studies are far from unanimous but strongly suggest that group size does influence the likelihood of collective action -in particular the level of trust and of convergence of interests (Agrawal and Yadama 1997; Vedeld 2000; Agrawal and Goyal 2001; Poteete and Ostrom 2004; Varughese, 2000; Varughese and Ostrom 2001). However there is no such consensus about the particular effect which these variables have and how does context (i.e. different combinations with other variables) mold the effect of these variables.Varughese (2000), looking at a sample of 18 villages in the Middle Hills in Nepal, found that population size did not seem to have a significant impact on collective action; while Agrawal and Goyal (2001) found a curvilinear relationship (first directly proportional, then inversely proportional) with collective action). Meanwhile, Vedeld (2000), comparing two villages in the Inland Niger Delta, found that although the larger village had more problems in coordinating CPR management, other factors and relationships, especially those related to leadership were more important in explaining the differences between the two villages. In reviews of the literature, Agrawal (2001) and Poteete and Ostrom (2004b) sentenced that the evidence was inconclusive, and that the effect was likely to be mediated by other variables, including the institutional structure itself. In general, however, it is hypothesized that groups are more likely to resolve a collective action problem when they are small. Some social movements scholars have made the opposite argument. For instance, Oliver and Marwell (1988) argued long ago that if the costs of acting vary little between different group sizes, then collective action becomes more likely with increasing group size, because larger groups have more resources and are more likely to have a critical mass of consistent contributors (see also Gamson 1990)."	For this variable either enter the number of actors (e.g. 30), or if the number of actors is very large and essentially uncountable, enter "Many."	Group members
11	External disturbances	Governance system	The governance activities within a social-ecological system can be undermined by threats and disturbances that occur.	Please name and describe the major threats that are affecting this MPA.	Text
12	Resource characteristics	Environmental common			
13	(Common) Political power and civil society	Actor	In many governance systems, the power to change rules may be limited to certain actors - such as a government agency or administrative body. Thus, while various users may participate in the process, their power may be limited. This variable is complementary to Participation in Rule Making. This relates to a design principle (collective choice arrangements) (Ostrom 1990).	How much power does this actor group have in the process that determines the governance of this commons?	1 Low, 2 Medium, 3 High
14	(Actor) Scientific knowledge	Actor	Knowledge of resource conditions is widely believed to be a requirement for sustainable management - i.e. if you don't know how the resources are doing, you cannot change management practices in response to changing resource conditions. Many presume that this knowledge must be based on systematic scientific monitoring (although others argue that local or traditional knowledge may also be important).	What is the level of scientific knowledge this actor group has regarding the condition of this environmental commons?	1 Low, 2 Medium, 3 High

Source of variables: SESMAD database https://sesmad.dartmouth.edu/variables

No.	SESMAD variables	Component Type	Importance	Question	Unit
15	Governance system effect	Governance system	One of the core interests of this research project is the effect of governance on commons. Although we are often interested in the condition of resources over time; environmental commons are often managed with a number of different goals in mind, both social and ecological. This question therefore is concerned with the performance of environmental governance systems in relation to the goals that groups set for the management of those resources. It is therefore possible that a resource might experience considerable declines, but still be considered to have met goals.	To what extent has this governance system achieved its goals in relation to the environmental commons?	1 Failed to meet goals, 2 Mixed effects on goals, 3 Met goals
16	Actor adaptive capacity	Actor	Adaptive capacity is an important social outcome that reflect the ability of different groups to respond to a variety of disturbances. Without such capacities, many groups will be unable to persist over time.	How would you rate the adaptive capacity of this actor group with respect to large changes in the availability or concentration of the commons they rely on in this snapshot?	1 Low, 2 Medium, 3 High
17	Actor traditional knowledge	Actor	Knowledge of resource conditions is widely believed to be a requirement for sustainable management - i.e. if you don't know how the resources are doing, you cannot change management practices in response to changing resource conditions. Many argue that traditional knowledge or local knowledge provides a vital source of information for making resource management decisions (although others argue for the primacy of traditional knowledge).	What is the level of traditional or local knowledge this actor group has regarding the condition of this environmental commons?	1 Low, 2 Medium, 3 High
18	Ecosystem service management	Actor	Ecosystem services are a lens through which human benefits from ecosystems can be considered (Millennium Ecosystem Assessment 2005, Daily et al. 2000). Some actor groups are explicitly managing for different kinds of ecosystem services.	Does this actor group explicitly manage for the following types of ecosystem services?	Provisioning, Cultural, Regulation
19	Economic heterogeneity	Actor	The effect of heterogeneity - including differences in assets or wealth – on the capacity of individuals to self-organise is highly contested (Varughese and Ostrom 2001). This variable allows us to test the importance of economic heterogeneity within actor groups on governance outcomes. It complements the variables ActorPoliticalHeterogeneity and ActorCulturalHeterogeneity.	How heterogeneous are the members of this actor group in economic terms (wealth, income)?	1 Low, 2 Medium, 3 High
20	Leadership	Actor	"Leadership may have an impact both on the emergence and maintenance of collective action, as well as on the effectiveness of the governance system. Additionally, leadership may be particularly important to understand processes of governance change. From a political economy perspective, leadership can be defined as individuals or groups within a community that often contribute more resources to the production of that good than the rest of the community (Olson 1965). In so doing, leaders frequently bear a disproportionate amount of the costs of collective action. Leaders have also been characterized for their sense of opportunity, social skills and knowledge. The governance activities associated to leaders range from reducing the costs of collective decision making and finding effective solutions for a particular environment (Ostrom et al. 1999) to developing a common vision and sense of shared problems (Folke et al. 2005)."	What type of leadership does this group have, if any?	No leader, Formal leader, Informal leader
21	Leadership authority	Actor	The willingness of someone to assume the costs of collective enterprises does not necessarily mean that such enterprises will be fully accomplished. Different variables can mediate that process, including leadership traits like authority. Some of the variables used in the field of natural resource management as a proxy for authority are formal positions, education, age or economic resources (Baland and Plateau 1996, Meinzen-Dick et al. 2002)	How much authority does the leader of this group hold?	1 Low, 2 Medium, 3 High
22	Livelihood alternatives	Actor	Actors that have access to many livelihood sources are likely to be more resilient (Adger 2000), but may be less likely to conserve a commons.	Other than this commons, does this actor group have access to alternative sources of economic livelihood or cultural well being?	1 Easily access other alternatives, 2 Can access other alternatives with some difficulty, 3 Cannot access alternatives
23	Property regime	Actor	Property regimes are distinct ways to manage a commons, and can play a large role in affecting outcomes for the commons via the incentive structures that they create for the actors involved.	What property regime does this actor group apply to this commons?	Private property, Common property, Public property, Corporate property, Open-access
24	Property security	Actor	Property security is sometimes mentioned in the theory of the tragedy of the commons, insofar as the absence of such security is predicted to lead to resource degradation. Inversely, the presence of property right security, most often as security of land tenure, is argued to be an important enabling condition to positive social and ecological outcomes in developing-world contexts (e.g. see http://usaidlandtenure.net/).	How secure are the rights that this commons user group has with respect to this environmental commons?	1 Low, 2 Medium, 3 High
25	Cultural heterogeneity	Actor	The effect of heterogeneity - including cultural differences such as ethnicity - on the capacity of individuals to self-organise is highly contested (Varughese and Ostrom 2001). This variable allows us to test the importance of cultural heterogeneity within actor groups on governance outcomes. The direction of the relationship between this variable and collective action is highly contested. It complements the variables ActorEconomicHeterogeneity and ActorPoliticalHeterogeneity.	How high is the level of variation in the cultural identity of the group members?	1 Low, 2 Medium, 3 High
26	Technology role	Actor	Technology plays a very important role in facilitating different relationships between a commons using group and the commons. The majority of such relationships are in fact entirely mediated by the use of some technology. The use of different technologies can ameliorate or exacerbate commons problems by encouraging or discouraging overuse of a commons.	How has technology affected the relationship between this actor group and the commons it uses in this interaction?	Increased commons conservation, Increased commons use, Increased productivity, Other
27	User group external support	Actor	External support can aid a local group by providing services and functions that they couldn't obtain otherwise, but it can also lead to negative outcomes (e.g. through perverse agricultural subsidies) and can crowd out local incentives for commons users to self-organize.	Does this commons using actor group receive external support (subsidies, logistics, scientific information) from external groups (NGOs, governmental agencies).	Yes/No
28	User-commons proximity	Actor	Residing within or adjacent to a particular commons can provide users with a sense of place and motivate them to conserve the nearby commons that they use.	Does this actor group reside within or adjacent to the primary resource in this interaction?	Yes/No
29	User group well-being change	Actor	The well-being of commons user groups is one of the primary social outcomes in the sesmad database. A system that preserves a commons at the expense of the well-being of the commons users is generally seen as being less effective.	How has the well-being of this commons user group changed during the time period identified in this interaction?	1 Worsened, 2 Remained the same, 3 Improved

No.	SESMAD variables	Component Type	Importance	Question	Unit
33	Provision services conditions	Environmental common	"The provisioning services provided by a commons is an important outcome of interest that project members can try to explain. Ecosystem services are a lens through which human benefits from ecosystems can be considered (Millennium Ecosystem Assessment 2005, Daily et al. 2000). This question seeks to ascertain whether the condition of provisioning services has worsened, is mixed or remained the same, or improved for an actor group. The variable applies to all relevant cultural services of the resource and governance system for that actor group."	What is the general trend in the condition (enhanced or degraded) of provisioning services (e.g., food, water, fiber, fuel) derived from this commons during the time frame of this snapshot?	1 Worsened, 2 Mixed effects or remained the same, 3 Improving
34	Regulating services conditions	Environmental common		What is the general trend in the condition (enhanced or degraded) of regulating services (e.g. climate, water regulation, disease regulation) derived from the commons during the time frame of this snapshot?	1 Worsened, 2 Mixed effects or remained the same, 3 Improving
35	Cultural services conditions	Environmental common	"The cultural services provided by a commons is an important outcome of interest that users can try to explain. Ecosystem services are a lens through which human benefits from ecosystems can be considered (Millennium Ecosystem Assessment 2005, Daily et al. 2000). This question seeks to ascertain whether the condition of cultural services has worsened, is mixed or remained the same, or improved for an actor group. The variable applies to all relevant cultural services of the resource and governance system for that actor group."	What is the general trend in the condition of cultural services (e.g. spiritual, aesthetic, recreation, education) derived from this commons during the time frame of this snapshot?	1 Worsened, 2 Mixed effects or remained the same, 3 Improving
36	Centralization	Governance system	The extent to which a governance system is centralized or not has large effects on how decisions are made and thus how the commons is managed and what outcomes are achieved.	Is this governance system highly centralized or highly decentralized?	1 Highly decentralized, 2 Somewhat decentralized, 3 Somewhat centralized, 4 Highly centralized
37	External support	Governance system	External support from a governmental agency can greatly aid in the ability of local commons users to overcome some comparative disadvantages of local, community-based governance (such as a lack of scientific information). On the other hand, such support can also crowd out the motivations of local users to self-organize and act collectively.	Within this governance system, do larger governmental and/or non-governmental organizations actively support (e.g. through the supply of physical or financial resources, information) lower level jurisdictions (States, Regions, Cities)? (Please clarify in the description who is providing the funding and how secure that funding is)	1 No support, 2 Some support, 3 Extensive support
38	Governance system age	Governance system	Some scholars (e.g. Ostrom 2005) have hypothesized that older governance system perform better. Age (>10 years) was one of the five key features identified by Edgar et al. (2014) associated with global conservation benefits.	What is the total age of this governance system from when it was originally designated to the end of this interaction?	Text
39	Governance system description	Governance system	This variable allows coder to provide the contextual information about the governance system that can aid in interpreting and better understanding its functioning and impact on the resource(s) being managed.	Please describe this governance system.	Text
40	Governance system spatial extent	Governance system	All else equal, it is hypothesized that larger governance systems do better in internalizing externalities and avoiding leakage effects.	What is the approximate spatial extent of this governance system (put in terms of square kilometers)?	Text
41	Horizontal coordination	Governance system	Informal vs. formal coordination imply potentially very different types of interactions actor groups. Groups that only interact formally will likely not have as much social capital developed as one that also involves informal. An informally coordination group may not have as much legal legitimacy as a formal one.	What type of coordination do the members of this actor group engage in with members of other actor groups that are also involved in the use and/or management of the resource?	No coordination, Informal, Formal, Both formal and informal
42	Institutional diversity	Governance system	Ostrom (2005) has argued that institutional diversity is important for the same reason that biological diversity is important: that different institutional arrangements are frequently a response to local conditions and thus a diversity of arrangements are needed in order to adapt to a diversity of environmental conditions.	How diverse are the institutions that are implemented by this governance system on this commons? Do these institutions vary systematically with natural variations in properties of this commons?	1 High, 2 Medium, 3 Low
43	Policy instrument	Governance system	Policy instruments structure the behavior and incentives that members of an actor group faces. In turns, these incentives and behaviors play a key role in affecting commons outcomes.	Does this formal governance system apply any of the following policy instruments to this commons?	Proportional outcome-based performance standard, Absolute outcome-based performance standard, Technological prohibition, Technological mandate, Temporal standard, Ban, Price ceiling, Price floor, Tax, Subsidy, PES scheme, Joint tax-subsidy, Market-based instrument, Information provision, Insurance provision, Protected area

No.	SESMAD variables	Component Type	Importance	Question	Unit
44	Scale match	Governance system	Mismatches between the spatial extent of the governance system and the spatial extent of the commons can create severe governance challenges, particularly when the scale of the commons spreads across multiple governance jurisdictions. In these circumstances no one governance system has the capability to control spatial externalities between systems. See Cumming, Cumming & Redman (2006) for an excellent review of these problems.	Does the scale of this governance system match the scale of the commons that it is governing?	Yes/No
45	Social-ecological fit	Governance system	Institutions that are poorly fit to the biophysical reality on which they are implemented are likely to lead to poor outcomes. While this is very obviously important, in a way this question and this variable is really just a starting point, from which the analyst should proceed to consider the precise nature of the fit, or lack thereof.	To what extent (low, medium, or high) do the institutional arrangements of this governance system fit well with the ecological or physical features of the commons on which they are implemented?	1 Low, 2 Medium, 3 High
46	Type of formal governance	Governance system	This variable does not necessarily have theoretical (causal) importance. But it can be important to identify what types of governance systems tend to have what effects on different types of commons problems.	What type of (formal) governance system is this?	Management plan, System of laws, Treaty
47	Transaction costs	Governance system	Transaction costs can impede collective action and effective commons management if they are too high. Therefore in many situations it is important to try to minimize transaction costs of institutional delelopment and enforcement. At the same time, such minimization is not universally desirable by all parties. For example, water markets with high transaction costs may actually prevent water from being bought and sold, which in many areas is considered to be benefical by the agricultural and rural interests, where many water rights currently reside. If transaction costs were lowered, then these markets would likely transfer water rights from agricultural uses to urban uses, where individuals can pay higher prices for them.	How high (or low) are the transaction costs of monitoring and enforcing the rules that this governance system involves in managing this commons?	1 Low, 2 Medium, 3 High

Source of variables: SESMAD database https://sesmad.dartmouth.edu/variables

Table 10. Variables definition based on SESMAD

No.	Design principles/Variables	Variables' Meanings and Values according SESMAD database			
9	Dependence on the Resource (economic dependence)	Actor	Interaction	Institutional-biophysical linkage:This is a sub-theme of the institutions theme, and describes those variables that ask about the relationship between a set of institutions and a biophysical aspect of a commons.	Economic Dependence refers to the extent to which members of the actor group rely on the commons to maintain their livelihood or economic well-being. A synonym for economic dependence is economic salience (Ostrom 2007). For pollutants this would mean that they are reliant on the process that produces the pollutant. Slightly dependent: The actor group derives no or very little of its economic well being from the use of this commons. Very Dependent: The actor group derives most or all of their economic well being from the use of this commons.
10	(Actor) Group size	Actor	Interaction	Incentives: This theme is associated with variables that are not directly related to institutions and rules, but which still play a role in affecting the incentives that commons users have to ameliorate or exacerbate the commons they use.	Size of a given actor group, in terms of numbers of members involved. Usually it is thought of as the number of individual people (e.g. for a community), but it could also refer to number of communities (e.g. for a federation or association of communities), associations (e.g. for a national network of organizations), municipalities, or countries, among others.
11	External disturbances	Governance system	Component	Context:contextual variable relates the component with which it associated to the social and/or ecological setting of a particular interaction and/or case.	A threat is a process/event that has the potential to severely damage an important function of a system.
12	Resource characteristics	Environmental common			
13	(Common) Political power and civil society	Actor	Interaction	Context:contextual variable relates the component with which it associated to the social and/or ecological setting of a particular interaction and/or case.	Power refers to the ability to change rules. High: Actor groups with high levels of power have the ability to change rules on their own (i.e. without consulting with or obtaining permission from other actors, and without being seriously challenged by other actors). Medium: Actor groups with moderate power may participate actively in rule-making, but their power is limited by the necessity to consult with others, be reviewed by others, or otherwise. Low: Actor groups with low power cannot change rules."
14	(Actor) Scientific knowledge	Actor	Interaction	Knowledge and uncertainty:Variables with this theme describe levels of knowledge that actor groups have regarding a commons, as well as factors that affect how much uncertainty there is in the status and dynamics of that commons.	Scientific knowledge refers to systematized knowledge based on systematic inquiry. Generally, scientific knowledge refers to knowledge available in peer-reviewed publications or other highly reputable sources (e.g. such as some government reports), produced by scientists with formal training. High: the condition of the resource is understood with a high degree of confidence by this actor group based on scientific information. Low: This actor group has little or no scientific information about the resource (e.g., no or very few studies have been done to ascertain the condition of the resource).
15	Governance system effect	Governance system	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	The governance system effect variable measures whether a governance system has met, failed to meet, or had mixed effects in relation to the goals

No.	Other variables	Component Type	Kind	Theme	Definition
16	Actor adaptive capacity	Actor	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	Adaptive capacity is an extremely complicated concept, and has been discussed in many different contexts (see Smit and Wandel 2006 for the most popular discussion). In one way or another, however, it boils down to the ability of an actor group to adapt to changing circumstances or disturbances. As the adaptive capacity of an actor group may be different depending on what type of discurbance is being considered, we specify in this variable that the disturbance in question is a large fluctiation in the availability (in terms of natural resources) or concentration (in terms of pollutants) of the commons they rely on within an interaction, and/or the stream of benefits associated with their use of this commons.
17	Actor traditional knowledge	Actor	Interaction	Knowledge and uncertainty:Variables with this theme describe levels of knowledge that actor groups have regarding a commons, as well as factors that affect how much uncertainty there is in the status and dynamics of that commons.	Local and traditional knowledge capture a diversity of forms of knowledge which are not based on scientific processes. Traditional knowledge refers to knowledge passed down through generations, generally among people living in a region for a long time - including, but not limited to indigenous people. Local knowledge refers to knowledge that people who live or work in an area have of the area or resource which may not be based on generations of residing in the area, but may be based on long observations by individuals. Although these people may have engaged in some kind of systematic inquiry to obtain this knowledge, it would generally not be published in formal sources, and the people conducting the inquiry would not have received systematic training in means of making systematic inquiry. High: the condition of the resource is understood with a high degree of confidence by this actor group based on traditional or local knowledge. Low: This actor group has little or no traditional or local knowledge about the condition of the resource.
18	Ecosystem service management	Actor	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the Enforcement theme.	Explicit management involves recognizing the ecosystem service(s), and developing management or other plans for ensuring their long-term sustainability. For example, payments for ecosystem services (e.g., water regulation) would be an explicit management of an ecosystem service. Provisioning services are defined by the Millennium Assessment (2005) as "products obtained from ecosystems, including: Food and fiber. This includes the vast range of food products derived from plants, animals, and microbes, as well as materials such as wood, jute, hemp, silk, and many other products derived from ecosystems. Fuel. Wood, dung, and other biological materials serve as sources of energy. Genetic resources. This includes the genes and genetic information used for animal and plant breeding and biotechnology. Biochemicals, natural medicines, and pharmaceuticals. Many medicines, biocides, food additives such as alginates, and biological materials are derived from ecosystems. Ornamental resources. Animal products, such as skins and shells, an flowers are used as ornaments, although the value of these resources is often culturally determined. This is an example of linkages between the categories of ecosystem services. Fresh water. Fresh water is another example of linkages between categories in this case, between provisioning and regulating services." Regulating services are defined by the Millennium Assessment (2005) as "the benefits obtained from the regulation of ecosystem processes, including (1) Air quality maintenance. Ecosystems both contribute chemicals to and extract chemicals from the atmosphere, influencing many aspects of air quality. Climate regulation. Ecosystems influence climate both locally and globally. For example, at a local scale, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases. (2) Water regulation. The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas. (3) Erosion control. Vegetative cover plays an important role in soil retention and the prevention of landslides. (4) Water purification and waste treatment. Ecosystems can be a source of impurities in fresh water but also can help to filter out and decompose organic wastes introduced into inland waters and coastal and marine ecosystems. (5) Regulation of human diseases. Changes in ecosystems can directly change the abundance of human pathogens, such as cholera, and can alter the abundance of disease vectors, such as mosquitoes. (6) Biological control. Ecosystem changes affect the prevalence of crop and livestock pests and diseases. Pollination. Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators. (7) Storm protection. The presence of healthy coastal ecosystems can
19	Economic heterogeneity	Actor	Interaction	Heterogeneity:Variables with this theme describe important ways in which the member of an actor group differ from each other.	"Economic heterogeneity refers to differences in capital assets, livelihoods, income and other economic endowments. These differences can make it more or less difficult for people to communicate, trust and co-operate with each-other. Low: There is little heterogeneity in the economic status of the members of these groups. Analogous to a Gini coefficient less than 0.3 Medium: Moderate economic heterogeneity. There is a distinguishable upper class, but this does not have a great majority of the available wealth. Analogous to a Gini coefficient between 0.3 and 0.5 High: There is enough heterogeneity that there are distinguishable subgroups with substantial differences in their economic endowments. A very small percentage of the members have a majority of the available wealth. Analogous to a Gini coefficient greater than 0.5"
20	Leadership	Actor	Component	Leadership:Leaders play an important role in commons management, most traditionally by providing for public goods needed to organize commons users. But there are other possible roles, and variables associated with this theme can relate to any role that a leader might play in an interaction.	"A leader is a singular individual/agent with entrepreneurial skills, high levels of motivation, respected as a leader, and who makes a personal commitment to commons governance. A formal leader is an agent who/that has a formal recognition as a leader (e.g., elected, appointed as a leader with a leadership mandate). An informal leader is an agent who emerges as a leader without formal position or leadership role (e.g., elders)"
	Leadership authority	Actor	Component	Leadership:Leaders play an important role in commons management, most traditionally by providing for public goods needed to organize commons users. But there are other	"This variable address whether a leader has the ability to have an influence over the behavior of other members in a group. Authority can be broadly seen as similar to power, which is understood as the ability of someone to carry out her or his will despite resistance (Weber 1964). Sources of authority (i.e. power) are diverse, including from formal positions in organizations, to different
21	Livelihood alternatives	Actor	Interaction	Incentives: This theme is associated with variables that are not directly related to institutions and rules, but which still play a role in affecting the incentives that commons users have to ameliorate or exacerbate the commons they use.	Alternatives refers to other economic or cultural activities that could fulfill the same function as an environmental commons for this actor group. For example, a person who works as a logger might be able to get a equally well-paying job in a factory, or a fisherman might be able to farm in a nearby field, or substitute his fishing with aquaculture. Note that this variable does not relate to the extent to which there are other commons available to this group of the same type that they are currently using (e.g. for fishermen, it does not refer to the availability of alternative fishing locations or stocks).
22	Property regime	Actor	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the Enforcement theme.	Specifies the property regime that this actor group applies to this environmental commons. The categories of public, common, corporate and private lie along a continuum. Private property: Private property is a regime that grants rights to individuals. Common property: Common property is a regime that grants to a group of individuals, each of which may then have usufructory rights based on their fulfillment of communal obligations. An example would be a Mexican "ejido" which grants collective ownership of land to a group of peasants. Government ("public") property: Government property is a regime that grants rights to a governmental entity, such as a nation-state. Commonly referred to as public property. Corporate property: Corporate property is a regime that grants rights to large corporations (not small family-run businesses, which would be private property). Open-access: Open-access is really a lack of any property regime, implying that there is no formal ownership structure to limit access to and/or use of a commons

No.	Other variables	Component Type	Kind	Theme	Definition
23	Property security	Actor	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the Enforcement theme.	Property right security refers to how clearly defined the rights of a commons using actor group are, and the extent to which these rights are respected by any other actors that might threaten the stream of benefits that are produced by those rights. High : High property security means that there is a strong common understanding of what aspects of a commons are owned, and that the rules associated with these rights are complied with. Low: Low property security means that there is either a very poor common understanding of what aspects of a commons are owned, or that despite this understanding, the rules associated with these rights are not complied with.
24	Cultural heterogeneity	Actor	Interaction	Heterogeneity:Variables with this theme describe important ways in which the member of an actor group differ from each other.	"Cultural heterogeneity refers to differences in cultural identity related to, for instance, class, ethnicity, language, traditions, religion, sense of place, and many other cultural aspects. These differences can make it more or less difficult for people to communicate, trust and co-operate with each-other. Definitions of values: High: The members of this actor group are very different with respect to the languages spoken, religion, and etchnicity. Low: The members of this actor group are very similar with respect to the languages spoken, religion, and etchnicity."
25	Technology role	Actor	Interaction	Technology:This theme is attached to variables that consider the role that technology and infrastructure have in affecting commons outcomes.	This variable describes the extent to which the use of current and/or new technologies by a commons using actor group has had various effects on how, and how much, it uses a commons. In natural resource cases, a frequent example is the implementation of a new extractive technology (electric pumps in irrigation systems, nets in fisheries systems) that enables users to extract more of a resource than had been previously possible. The following values are not necessarily mutually exclusive (although the first two are): Increased commons conservation: The implementation of new technology decreases the extent to which a commons is used (resource extracted, pollutants emitted). Increased commons use: The implementation of new technology increases the extent to which a commons is used (resource extracted, pollutants emitted). Increased productivity: The implementation of new technology increases the productivity, and thereby the efficiency (relative to at least one type of input but generally not all) of the use of a commons. Decreased productivity: The implementation of new technology decreases the productivity, and thereby the efficiency (relative to at least one type of input but generally not all) of the use of a commons.
26	User group external support	Actor	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the Enforcement theme.	External support to a commons user group can involve financing/subsidies, new infrastructure, information, or any other resource that is designed to alter the ways in which the commons user group interacts with their environment. This variable is similar to the variable "external support", but it is specific to support provided to a commons user group.
27	User-commons proximity	Actor	Interaction	Incentives: This theme is associated with variables that are not directly related to institutions and rules, but which still play a role in affecting the incentives that commons users have to ameliorate or exacerbate the commons they use.	Residing within or adjacent to a commons means that this actor group lives full-time within the geographical boundaries of this resource, or at least at the edge of it in a way that has a similar effect on their relationship to the resource.
28	User group well-being change	Actor	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	Well-being here is defined broadly as the economic and cultural well-being of the commons user group, much of which is tied to the state of a commons upon which it depends. This could have different dimensions for different user groups, e.g. for commercial fishers this could be economic values, and for subsistence users this could be an indicator of poverty.
29	Commons heterogeneity	Environmental common	Component	Spatial:Variables associated with the Spatial theme describe important spatial patterns or dynamics, such as the spatial heterogeneity of a commons, or whether or not a user group resides within a particular commons.	"The distribution of a commons in a geographic area along a scale from uniform (low) to patchy (high) (Bakus 2007). High: Multiple clearly defined sub-units can be identified within the commons Low: No patches or uniform distribution of a commons over its spatial extent."
30	Commons spatial extent	Environmental common	Component	Spatial:Variables associated with the Spatial theme describe important spatial patterns or dynamics, such as the spatial heterogeneity of a commons, or whether or not a user group resides within a particular commons.	The spatial extent of a commons is either (1) the actual extent of a natural resource system or (2) the range of a natural resource unit or pollutant.
31	Environmental Common Scientific knowledge	Environmental common	Interaction	Knowledge and uncertainty:Variables with this theme describe levels of knowledge that actor groups have regarding a commons, as well as factors that affect how much uncertainty there is in the status and dynamics of that commons.	"This question seeks to ascertain the state of scientific knowledge regarding the resource and available to decision makers. A strong scientific basis for decision-making would indicate that resource dynamics (e.g., rate of renewal, resilience of resource to disturbance, ecosystem function of the resource, etc.) are generally understood, although the strength of scientific knowledge of one resource as compared to another is relative. In other words, this variable allows the analyst to rank the strength of scientific knowledge of a resource, as compared to another resource of its same taxonomic family rather than scientific knowledge in general. This variable is applicable to cases involving natural resources as well as pollution. Scientific may contrasted with traditional/indigenous knowledge. Low: There is a superficial or rudimentary level of understanding about resource characteristics and dynamics, or there is a highly controversial understanding of the characteristics and dynamics. High: There is a deep and broad consensus regarding the level of understanding about resource characteristics and dynamics."
32	Provision services conditions	Environmental common	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	"This variable describes trends in the condition of provisioning services provided by the commons in an interaction. Provisioning services are defined by the Millennium Assessment (2005) as ""…products obtained from ecosystems, including: Food and fiber. This includes the vast range of food products derived from plants, animals, and microbes, as well as materials such as wood, jute, hemp, silk, and many other products derived from ecosystems. Fuel. Wood, dung, and other biological materials serve as sources of energy. Genetic resources. This includes the genes and genetic information used for animal and plant breeding and biotechnology. Biochemicals, natural medicines, and pharmaceuticals. Many medicines, biocides, food additives such as alginates, and biological materials are derived from ecosystems. Ornamental resources. Animal products, such as skins and shells, an flowers are used as ornaments, although the value of these resources is often culturally determined. This is an example of linkages between the categories of ecosystem services. Fresh water. Fresh water is another example of linkages between categories—in this case, between provisioning and regulating services.""""

No.	Other variables	Component Type	Kind	Theme	Definition
33	Regulating services conditions	Environmental common	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	"This variable describes trends in the condition of regulating services provided by the commons in an interaction. Regulating services are defined by the Millennium Assessment (2005) as ""…the benefits obtained from the regulation of ecosystem processes, including: Air quality maintenance. Ecosystems both contribute chemicals to and extract chemicals from the atmosphere, influencing many aspects of air quality. Climate regulation. Ecosystems influence climate both locally and globally. For example, at a local scale, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases. Water regulation. The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas. Erosion control. Vegetative cover plays an important role in soil retention and the prevention of landslides. Water purification and waste treatment. Ecosystems can be a source of impurities in fresh water but also can help to filter out and decompose organic wastes introduced into inland waters and coastal and marine ecosystems. Regulation of human diseases. Changes in ecosystems can directly change the abundance of human pathogens, such as cholera, and can alter the abundance of disease vectors, such as mosquitoes. Biological control. Ecosystem changes affect the prevalence of crop and livestock pests and diseases. Pollination. Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators. Storm protection. The presence of coastal ecosystems such as mangroves and coral reefs can dramatically reduce the damage caused by hurricanes or large waves.""""
34	Cultural services conditions	Environmental common	Interaction	Outcomes:This theme is attached to variables that deal with any outcomes that are produced by the actions of relevant actors in an interaction.	"This variable describes trends in the condition of cultural services provided by the commons in this interaction. Cultural services are defined by the Millennium Assessment (2005) as ""…the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences, including: Cultural diversity. The diversity of ecosystems is one factor influencing the diversity of cultures. Spiritual and religious values. Many religions attach spiritual and religious values to ecosystems or their components. Knowledge systems (traditional and formal). Ecosystems influence the types of knowledge systems developed by different cultures. Educational values. Ecosystems and their components and processes provide the basis for both formal and informal education in many societies. Inspiration. Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising. Aesthetic values. Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, "scenic drives," and the selection of housing locations. Social relations. Ecosystems influence the types of social relations that are established in particular cultures. Fishing societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies. Sense of place. Many people value the "sense of place" that is associated with recognized features of their environment, including aspects of the ecosystem. Cultural heritage values. Many societies place high value on the maintenance of either historically important landscapes ("cultural landscapes") or culturally significant species. Recreation and ecotourism. People often choose where to spend theileisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area.""""
35	Centralization	Governance system	Component	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	A centralized governance system has few actors/actor groups that hold a disproportionate amount of authority of over actors or parts of a commons. More decentralized governance systems have flatter hierarchies. Highly decentralized: The decision-making authority with respect to a commons lies primarily within individual users. Somewhat decentralized: The decision-making authority with respect to a commons lies primarily within communities of users. Somewhat centralized: The decision-making authority with respect to a commons lies primarily within some form of regional governance unit (a district, municipality, province/state, special district) Highly centralized: The decision-making authority with respect to a commons lies primarily within a national government or centralized bureaucracy.
36	External support	Governance system	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	Support can take many forms, such as the offering of material assistance, intangible resources such as scientific expertise or environmental information. No support: Higher level organizations involved provide no support to lower level jurisdictions. Some support: Higher level organizations involved provide moderate or sporadic levels of support to communities. Extensive support : Higher level organizations involved provide extensive, ongoing support.
37	Governance system age	Governance system	Interaction	Basic:A basic variable describes essential and basic background information for a component.	Age of a governance system defined in years since the date the area was originally designated (this can be before the BeginDate variable, if the area was actually deisgnated outside of the snap-shot being used in this case).
	Governance system description	Governance system	Interaction	Basic:A basic variable describes essential and basic background information for a component.	Description of the governance system being analyzed. The description should include the overall goals/objectives and the key aspects and events that shaped and impacted the governance system. The description should be less than 500 words, and should include citations.
38	Governance system spatial extent	Governance system	Component	Spatial:Variables associated with the Spatial theme describe important spatial patterns or dynamics, such as the spatial heterogeneity of a commons, or whether or not a user group resides within a particular commons.	The spatial extent of a governance system is the geographic area that is formally within its jurisdiction
39	Horizontal coordination	Governance system	Component	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	Coordination in this case refers to a clear distinction between formal and informal coordination. Formal coordination is governed by formal rules, themselves usually written down. Informal coordination does not rely on formal rules.
40	Institutional diversity	Governance system	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	Institutional diversity is a property of a governance system that describes the extent to which this governance system contains a range of distinct institutional arrangements that vary systematically to respond to variations in the demands of environmental governance. High: High institutional diversity means that a governance system applies a highly diverse set of institutional arrangements to match a diversity of environmental contexts. Low: Low institutional diversity means that a governance system applies a highly homogenous set of institutional arrangements to a diversity of environmental contexts.

No.	Other variables	Component Type	Kind	Theme	Definition
41	Policy instrument	Governance system	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	This variable contains a taxonomy of the basic types of policies and institutions that a governance system uses in order to affect actor behavior and achieve commons outcomes. It fairly directly relates to the literature on environmental policy instrument choice (e.g. see , although it uses some of its own terminology, avoiding loaded terms such as "command and control." These policies are also related to each other in a small hierarchy, which is presented in the following indented list: Output-based standards Outcome-based ambient standards / rights Proportional outcome-based performance standards Absolute outcome-based performance standards Market-based instruments Input-based standards Technological standards Technological prohibitions Technological mandates Temporal standards Bans Market-based standards Price ceiling Price floor Incentive-based instruments Tax Subsidy Joint tax-subsidy Payment for ecosystem services (PES) schemes Market-based instruments Information provision Insurance provision Protected area Standards and rights: Standards are distinguished from other instruments in that they all are constituted by rules that are highly prescriptive. They generally mandate, permit, and forbid various behaviors or outcomes. Output-based standards are distinguished from input-based standards (terminology borrowed from fishery policy literature) in that the former mandate or forbid certain outcomes, whereas the latter
42	Scale match	Governance system	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	Spatial mismatches occur when the spatial scales of management and the spatial scales of ecosystem processes do not align appropriately (Cumming et al. 2006). For example, if a local community is attempting to manage a highly migratory species by focusing on only a very small portion of its range, there is a mismatch in the scale of management and the species' range.
43	Social-ecological fit	Governance system	Component	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	
44	Type of formal governance	Governance system	Component	Basic:A basic variable describes essential and basic background information for a component.	"The management plan option specifies that there is a structure of rules which is derived from the formal legal system such as acts, statutes, and laws. The system of laws option indicates that the governance system in case is derived directly form the formal legal system such as acts, statutes, and laws. The treaty option specifies that a governance system in place is based on a formally concluded and ratified agreement among states."
45	Transaction costs	Governance system	Interaction	Institutions:Variables with this theme describe the social institutions (rules, property rights) that are used to organize and direct human behavior. It does not include monitoring and enforcement of these institutions, as these are associated with the En	Transaction costs have been defined as those costs which are “incurred as a result of collecting information, making decisions, formulating institutional rules, monitoring compliance with these rules, and enforcing these rules” (Paavola and Adger 2005, 357). Although labeled as costs, which might imply an ability to quantitatively measure them with some precision, this is seldom the case.

Source of variables: SESMAD database https://sesmad.dartmouth.edu/variables

Annex 4. Stakeholders

Table 11. Fieldwork, focus groups and interviews

City/ Village	Institution/Group of Interest	Person/s	Date of meeting	Meeting location	Purpose of meeting
Prrenjas / Skënderbej	Forest users – commoners	Local resident/ Forest user	29 May 2015	National Park of Shebenik-Jabllanicë	Field work: Visit the pristine forest of the mountainous National Park and track one of the two main sources of Shkumbini River Basin; Interview on the SESMAD variables.
Elbasan	Municipal Agency on Forests, Agriculture and Veterinary	Fatmir Vedollari: Director	29 April 2016	REA premises in Elbasan	Collection of data and maps on forests (the forest cadastral maps of 1984-1985).

Elbasan	Municipal Forest Directorate	Fatmir Vedollari, Shpëtim Cullaj: Administrator of Gjinar Unit in the Municipality of Elbasan	16 April 2016 22 April 2016	Municipality	Collection of data and maps on forests.
Elbasan	Municipal Agency on Forests, Agriculture and Veterinary	Abaz Hyraj: Forests Specialist	6 May 2016	Municipality	Collection of data and maps on forests (the forest cadastral maps of 1984-1985).
Elbasan	Evironment Directorate	Environmental expert in the Municipality	6 May 2016	Municipality	Collection of data and maps on forests (the forest cadastral maps of 1984-1985).
Elbasan	AdZM Elbasan Qark (Regional Directorate for Protected Areas)	Fatmir Brazhda: Director of AdZM Bajram Kullolli: Key Expert	14 July 2016	REA premises in Librazhd	Interview, meeting, exchange of information on protected areas and some of the SESMAD variables.
Elbasan	Regional Environmental Agency (REA) for Elbasan	Lutfi Gjinushi: Director Beqir Kila: Key expert Olger Dhima: Specialist for EIA Edmond Xhufka: Specialist for EIA Ardit Milloshi: Specialist for EIA Pëllumb Xhamati: Inspector	5 July 2016 14 July 2016	REA Premises in Elbasan	Interview, focus group, exchange of information on SEA for Elbasan, environmental monitoring, hot spots, erosion, natural resources, the conditions of Shkumbini watershed.
Gramsh / Lenie, Valamare	Municipal Forests Directorate	Blendi Coha Forests Expert/Engineer Flamur Roshi: Head of the Local Forests Directorate at the Municipality	6 October 2016	Gramsh/ Lenie and Valamare	Field Work and Interview on SESMAD variables (including the 8 design principles). Visit to: Lenie mountainous forests and pastures and Valamare, which is the location of one of the 2 main sources of Shkumbini River
Tiranë	Ministry of Environment	Valbona Ballgjini: Director of Support Services Directorate	11 November 2016	Tiranë, Minsitry of Environment	Data collection on forests for the municipalities of the Shkumbini River basin
Tiranë	Ministry of Environment	Ylli Hoxha: Director of the Forest Directorate	11 November 2016	Tiranë, Minsitry of Environment	Interview on the status of the Environmental Services Projects and the GIS database on forests
Librazhd	Municipal Forests Directorate	Bledar Çota: Director; Bajram Kullolli: Key Expert of AdZM; Enver Shkurti: Deputy Mayor of Librazhd; Qerim Facja: forests management expert; Aleksandër Brazhda: forest specialist; Dilaver Blloshmi: Head of local forests inspectorate;	4 April 2017	Municipal Forests Directorate premises	Interview and Focus Group on SESMAD variables (including the 8 design principles)
Elbasan	Municipal Agency on Forests, Agriculture and Veterinary	Fatmir Vedollari: Director of the Agency	4 April 2017 4 August 2017	Municipality	Interview on forests management, focusing on the commons regime
Elbasan	Klubi Ekologjik [Ecological Club - NGO]	Ahmet Mehmeti: Forests engineer; director of the NGO; expert in trimming and pruning techniques for shrubs	4 April 2017	Elbasan	Interview on forests management focusing on silvopastoral practices and ecosystem services as well as on maintenance of forests and shrub areas
Tiranë	POLIS University	Prof. Dr. Vezir Muharremaj Senior Expert in Forest Management and Commons regimes at local and national level;	Various meetings during 2016-2017	POLIS University premises	Interview; Advisory meetings

		President of the National Forests Federation; Dean Of the Research Faculty at POLIS University; Previous head of the National Directorate of Forests;			
Elbasan	Municipal Agency on Forests, Agriculture and Veterinary	Fatmir Vedollari: Director Qemal Poka: Specialist	20 September 2017	Agency premises	Discuss on the cooperation of the municipality with users of communal forests, and the variables of the SESMAD.
Labinot Fushë	Forest users – commoners	14 participants: the alderman and the commoners	20 September 2017	Griqan i sipërm village	Focus group to discuss the 8 design principles of Ostrom and other variables of the SESMAD.
Shushicë	Forest users – commoners	8 participants: the alderman, the head of the forest users association and 6 commoners	21 September 2017	Shelcan village	Focus group to discuss the 8 design principles of Ostrom and other variables of the SESMAD.
Tregan	Forest users – commoners	4 participants: the head of the forest users association and 3 commoners	22 September 2017	Kyçyk village	Focus group to discuss the 8 design principles of Ostrom and other variables of the SESMAD.
Papër	Forest users – commoners	Bashkim Musai – farmer and commoner (representing the village)	22 September 2017	Veles village	Interview to discuss the 8 design principles of Ostrom and other variables of the SESMAD.
Librazhd	Forest users – commoners	3 commoners/farmers	23 September 2017	Librazhd center – the agriculture and forestry products fair organised by the Municipality and other actors	Interview with the commoners on the 8 design principles as well as the SESMAD variables.
Pogradec	Municipal forest staff	Avni Mara – forest specialist in the Municipality	04 October 2017	Pogradec Municipality	Interview on forest management and the application of the CPR system for forests
Golik Proptisht Mokër	The head of the association and Forest users – commoners	1 commoner and the head of the association	04 October 2017	Peshkëpi village	Focus group with commoners and the head of the association on the 8 design principles and SESMAD variables
Peshkëpi / Pogradec	The head of the association and Forest users – commoners	4 commoners and the head of the association	04 October 2017	Golik village	Interview with commoners and the head of the association on the 8 design principles and SESMAD variables.

Annex 5. Parameters monitored and analysed for Shkumbin surface water quality and reference standards

River sections	pH	Light transparency (cm)	Eletric Conductivity (µS/cm)	Total Suspend Solids (mg/l)	Total Dissolved Solids (mg/l)	Dissolved oxygen (mg/l)	Temperature (0 C)	N-NH4 (mg/l)	N-NO2 (mg/l)	N-NO3 (mg/l)	SO4 (mg/l)	Coliform count (Cfu)	Biochemical Oxygen Demand (mg/l)
Shkumbin 1	8.71	62.50	336	< 2	173	8.85	23.40	0.120	0.003	0.230	25.0	>300	0.32
Shkumbin 2	8.73	106.25	337	< 2	173	8.10	21.80	0.120	0.006	1.400	20.0	>300	0.34
Shkumbin 3	8.70	50.00	307	< 2	158	8.39	24.60	0.080	0.006	1.700	21.0	>300	0.25
Shkumbin 4	8.51	75.00	261	< 2	110	7.95	24.00	0.130	0.016	0.130	18.0	>300	0.12
Shkumbin 5	8.56	95.00	301	< 2	154	8.35	22.20	0.170	0.020	1.600	3.0	>300	0.22
Shkumbin 6	8.82	55.00	342	< 2	176	10.20	23.70	0.960	0.005	1.200	3.0	>300	0.80
Shkumbin 7	8.84	50.00	343	< 2	176	8.75	23.50	1.020	0.040	0.280	3.0	>300	0.80
Shkumbin 8	9.17	50.00	308	< 2	158	10.87	26.80	0.250	0.180	0.390	4.0	>300	0.90
Shkumbin 9	8.51	37.50	261	< 2	134	7.95	24.30	0.130	0.051	0.150	18.0	>300	0.64
Shkumbin 10	8.24	52.50	636	< 2	330	7.42	27.50	0.320	0.070	0.240	61.0	>300	0.64
Shkumbin 11	8.27	162.50	701	< 2	364	8.89	30.70	0.050	0.030	0.370	69.0	>300	1.28
National and international water quality standards for fresh waters (not for drinking water)													
Standards (from the directives listed below)	6-9 (2)	100 (6)	150-500 (4)	≤ 25 (rec) (2)		>6 (2)		≤ 1 (2)		≤ 0.025 (0.005 rec) (2)		<330 (5)	≤ 3 (rec) ≤ 6 (rec) (2)
(3) Council Directive CEE/CEEA/CE 78/659					500 (7)			≤ 1 (0.04 is the rec value)	≤ 0.01 (rec) - ≤ 0.03 (rec)	≤ 0.025	250 (7)		≤ 3 (rec) ≤ 6 (rec)
Water Quality Standards in Netherland	5.6-6			3-5 (for III class water quality)								50-200 (for III class water quality)	

River sections	Pb (µg/l)	Cd (µg/l)	Mn (µg/l)	Ni (µg/l)	Zn (µg/l)	Cu (mg/l)	Co (µg/l)	Cr (mg/l)	Hg (µg/l)	As (µg/l)	Fe (mg/l)	Br (µg/l)
Shkumbin 1												
Shkumbin 2												
Shkumbin 3												
Shkumbin 4												
Shkumbin 5												
Shkumbin 6												
Shkumbin 7												
Shkumbin 8	630.00	120.00	2.66	220.00	4.62	0.10	n.d< 0.1	0.05	n.d< 0.1	< 2	39	n.d < 0.1
Shkumbin 9	200.00	110.00	1.51	180.00	9.02	0.25	n.d < 0.1	0.05	n.d < 0.1	< 2	46	n.d < 0.1
Shkumbin 10												
Shkumbin 11												
National and international water quality standards for fresh waters (not for drinking water)												
	7.2 (1)	<0.09 (1)		20 (1)	≤ 300 - <1000 (2)	≤ 0.04 (rec) (2)			0.05 (1)			
					≤ 300	≤ 0.4(rec) -≤ 0.04 (rec)						
	0.3	0.08	30	3.3	2.9		0.5	0.0003	0.01	1	0.1-0.3	

(1)	**VKM 246/2014** "Per Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" which is a transposition of DIRECTIVE 2008/105/EC on environmental
(2)	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing Directive 78/659/EEC
(3)	**Council Directive CEE/CEEA/CE 78/659** (Direktiva e Komisionit Evropian CEE/CEEA/CE 78/659 për cilësinë e ujërave të ëmbla për rritjen e peshqve)
	The Ministry of Environment still used the water quality standards of this directive to monitor and evaluate the water quality of rivers and lakes in 2013.
	In 2006, this directive was repealed by **DIRECTIVE 2006/44/EC** on the quality of fresh waters needing protection or improvement in order to support fish life.
	Whenever **two values are present**, the first value refers to salmonid waters, the second value referes to cyprinid waters.
	Albania still does not distinguish between salmonid and cyprid waters
(4)	**EPA USA reccomandations**: Water quality stadards taken from **EPA USA reccomandations**. This is the range of water quality standards considered safe for fish to
(5)	**DIRECTIVE 2006/113/EC** of The European Parlament and of The Council of 12 December 2006 on the quality required of shellfish waters
(6)	**VKM nr.797, datë 29.9.2010** Për miratimin e rregullores higjieno-sanitare "Për
(rec)	Recommended values
Cd and Hg	**DIRECTIVE 2006/11/EC** of European Parlament reccomends EU member to take appropriate steps to eliminate Cd and Hg from inland surface waters, territorial waters
Cd	The concentration of Cd depends on water hardness. However, maximom concentration allowed in waters is < 0.25 micrograms/L
III class water quality	whenever possible, class III water quality standards have been choosen (based on ECE river water quality classification) since it seems to fit more to the rivers' water quality under assessment
Red colored values	Values above water quality standards defined by the above legislation

Parameters	**Unit**	**EQS**					**Directives / Laws considered**
		I (excellent)	**II** (good)	**III** (satisfacoty)	**IV** (fair)	**V** (bad)	
pH		6-9	6-9	6-9	6-9	6-9	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality (repealing **Directive 78/659/EEC)**
Light transparency	cm	100	100	100	100	100	**VKM nr.797, datë 29.9.2010** Për miratimin e rregullores higjieno-sanitare "Për administrimin e cilësisë së ujërave të larjes"
EC-Eletric Conductivity	µS/cm	150-500	150-500	150-500	150-500	150-500	Water quality stadards taken from **EPA USA reccomandation** considered safe for fish to conduct a healthy life
TSS -Total **Suspend** Solids (*G values)*	mg/l	<25	<25	<25	<25	<25	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**
TDS -Total **Dissolved** Solids	mg/l	500	500	500.00	500	500	USA -EPA http://www.dep.wv.gov/WWE/Programs/wqs/Documents/Triennial%20Review/May%2018,%202009/17155_tds.pdf
DO (cyprinid waters) (for salmonid waters >6)	mg/l	4	4	>4	4	4	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**
T-Temperature (0 C)							
N-NH4 I values for cyprinid waters (for the same waters, G values < 0.2)	mg/l	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**
N-NO2 - G values for cyprinid waters (for salmonid waters, G values ≤ 0,01mg/l)	mg/l	≤ 0.03	≤ 0.03	≤ 0.03	≤ 0.03	≤ 0.03	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**
N-NO3	mg/l	<0.8	<2	<4	<10	>10	AKM dhe http://water.epa.gov/type/rsl/monitoring/vms57.cfm
SO4 (duhet ndryshuar ne 150 mg/l sipas 75/440/EEC Directive)	mg/l	250	250	150 (ishte 250)	250	250	USA -EPA http://www.dep.wv.gov/WWE/Programs/wqs/Documents/Triennial%20Review/May%2018,%202009/17155_tds.pdf

Parameters	Unit	EQS I (excellent)	II (good)	III (satisfacoty)	IV (fair)	V (bad)	Directives / Laws considered			
Coliform count (Cfu)	Cfu/100ml	5.00	50.00	200.00			**VKM nr.797, datë 29.9.2010** Për miratimin e rregullores higjieno-sanitare "Për administrimin e cilësisë së ujërave të larjes"	DIRECTIVE 2006/7/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the management of bathing water quality and repealing Directive 76/160/EEC		
BOD-Biochemical Oxygen Demand (G-values for cyprinid waters) (*<3 for salmon waters*)	mg/l	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**			
Pb -priority hazardous substance	µg/l	7.20	7.20	7.20	7.20	7.20	**DIRECTIVE 2008/105/EC - VKM 246/2014** "Per Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" which is a transposition of DIRECTIVE 2008/105/EC on environmental quality standards for priority substances and certain other pollutant			
Cd - priority hazardous substance	µg/l	≤ 0.08	0.08	0.09	0.15	0.25	**DIRECTIVE 2008/105/EC)VKM 246/2014** "Per Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" which is a transposition of DIRECTIVE 2008/105/EC on environmental quality standards for priority substances and certain other pollutant			
Mn	µg/l			100 (ishte 30)			Water Quality Standards from Netherlands	1000	µg/l	Directive 75/440/EEC
Ni - priority hazardous substance	µg/l	20.00	20.00	20.00	20.00	20.00	(**DIRECTIVE 2008/105/EC**) **VKM 246/2014** "Per Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" which is a transposition of DIRECTIVE 2008/105/EC on environmental quality standards for priority substances and certain other pollutant			
Zn - I values for cyprinid waters (for salmonid waters, I values -< 0.3)	mg/l	≤ 1,0	≤ 1,0	≤ 1,0	≤ 1,0	≤ 1,0	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**			
Cu - G-values for cyprinid waters (salmonid waters have the same EQS)	mg/l	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04	**DIRECTIVE 2006/44/EC** of 15 February 2006 concerning the management of bathing water quality and repealing **Directive 78/659/EEC**			
Co	µg/l			50 (ishte 0.5)			Water Quality Standards from Netherlands			
Cr	mg/l			2 (ishte 0.0003)			Water Quality Standards from Netherlands	0.05	mg/l	Directive 75/440/EEC
Hg - priority hazardous substance	µg/l	0.05	0.05	0.05	0.05	0.05	**(DIRECTIVE 2008/105/EC) VKM 246/2014** "Per Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" which is a transposition of DIRECTIVE 2008/105/EC on environmental quality standards for priority substances and certain other pollutant			
As	µg/l			1			Water Quality Standards from Netherlands	100	mg/l	Directive 75/440/EEC
Fe	mg/l			0.3			Water Quality Standards from Netherlands			
Br	0			0			0			

I values = Mandatory values
G values = Guide values

Annex 6. Format of questionnaires administered on the Tirana Urban Lake Forest for purposes of ecosystem valuation

Title: *Questionnaire on the assessment of the ecosystem services of the Tirana Lake Park Forest*

Purpose: This questionnaire is prepared under the frame of the initiative to study and assess ecosystem services as a preliminary step in planning and land development decision-making. Decisions related to land development are usually based on utility values – mainly economic profit ones. The environmental aspect is usually not considered. Furthermore, decision-makers and planners have limited or no knowledge on the services provided by the ecosystem. As a result, even in those cases where preliminary analysis precedes decision-making, it is incomplete from the perspective of impacts on the ecosystem and human health. Through this questionnaire, the aim is to understand and assess the value that citizens/users assign to a forest ecosystem and its services. The valuation is made through the contingent valuation method, measuring willingness to pay.

The questionnaire is organised in 4 sections:

I. Understanding the ecosystem that is being evaluated – Tirana lake park
II. Citizens' preferences on ecosystem and ecosystem services protection
III. Financial mechanism and willingness to pay for protecting the ecosystem and its services
IV. Ability to pay and social aspects of the population

Note: The information will be used only for scientific research and study purposes and will not be transferred to third parties. The privacy of the interviewees is guaranteed.

O. Shortly describe in this box the activities that the respondent was carrying out when asked for the interview (filled in by the interviewer based on observation only)

I. UNDERSTANDING THE ECOSYSTEM THAT IS BEING EVALUATED – TIRANA LAKE PARK

Park entrance (completed by the interviewer) _____

1.1 In which year do you think the lake park was created? _____

1.2 What do you think is the current area of the park? _____ **(ha)**

1.2.1 Specify if this area include or not the lake: **YES** **NO**
1.2.2 Do you think the park area has decreased after 1990? **YES** **NO**
1.2.3 What do you think is the % of decrease? _____% of the total before 1990

1.3 Define the park use frequency:

a) The first time I come
b) Less than 1 time a week
c) Once a week
d) 2-3 times a week
e) 4-6 times a week
f) Every day

1.4 The purpose of using the park:

a) walking
b) cycling
c) sports and physical well-being
d) to observe the plants
e) to bring the children
f) to walk the dog
g) other *(specify)*_____

1.5 The way of use

a) alone
b) friends/relative
c) family/children
d) combined

1.6 Time spent:

a) up to 1 hour
b) 1-2 hours
c) 2-4 hours
d) more (*specify)*_____

1.7 Çfarë lloj bimësie njihni/jeni në gjendje të identifikoni në park?

1.7.1 Drurë të lartë:
a) lis;
b) cedër;
c) panjë;
d) selvi;
e) kumbulla;
f) ligustër;
g) pishë;
h) eukalipt
k) nuk di

1.7.2 Shkurre
a) ligustër
b) hibiscus;
c) shegë;
d) oleandër;
e) tjetër*(specifiko)*____

1.7.3 Bimë barishtore lule
*specifiko*_____
_____
_____
_____
_____

i) frashër
j) tjetër *(specifiko)*____
nuk di

1.8 If you have seen birds and animals in the park, please name them:

_____

_____

II. CITIZENS' PREFERENCES ON ECOSYSTEM AND ECOSYSTEM SERVICES PROTECTION

2.1 Insert X at the level of importance for any service provided by the lake park that you are concerned about, or are interested in:

Forest ecosystem services	No service	Not important	Partially important	Important	Very important
a) Nice for walking					
b) Sports/ physical activities					
c) Recreation with kids					
d) Natural space for recreation					
e) Bird watching					
f) Fire wood					
g) Collect herbs and flowers					
h) Take soil for planting					
i) Biodiversity protection					
j) Increase water infiltration					
k) Improve rain water filtration					
l) Clean air in Tirana					
m) Health recuperation					
n) Tirana's pride – social value					

2.2 How do you value the quality of park in years (chose one):

a) has improved
b) no change
c) has worsened

2.3 Select your preference for the future:

2.3.1 Conserve the Lake park forest in its current state *(no additional intervention, excluding maintenance)?* YES NO

2.3.2 Modify the Lake park forest by adding playground / sports grounds with concrete content, despite reducing the surface area with trees? YES NO

2.3.3 Construct in the lake park children's games on natural land / grass without affecting the number of existing trees? YES NO

2.3.4 Construct bars and restaurants in the lake park? YES NO

2.4 If you had the opportunity to have a house in a parcel located partially adjacent to the park area and partially within the park area, would you accept it?
YES

NO

2.5 What is your opinion on the possibility to transfer a part/the total of the park area from nature to urban use for construction?

a) It is normal as long as there is demand for construction;
b) It is unacceptable because it reduces the green area;
c) I am indifferent;
d) Other *(specify)* _____.

2.6 How much do you think you have to be compensated for as a family if the lake park closes / returns to a residential area? _____*lekë.*

2.7 What impact do you think construction within the park would have, regardless of the use of the object in?

The ecosystem service	Negative impact	No impact	Positive impact
a) Forest landscape beauty			
b) Forest biodiversity			
c) Tourism			
d) Walk in the forest			
e) Cycling in the forest			
f) Sports in the forest			
g) Forest air quality			
h) Forest soil quality			
i) Erosion			
j) Floods			
k) Quality of the water infiltrated in soil			
l) Vegetation health			
m) Number of birds			
n) Citizen pride on the park			
o) Tirana air quality			

III. FINANCIAL MECHANISM AND WILLINGNESS TO PAY FOR PROTECTING THE ECOSYSTEM AND ITS SERVICES

Suppose that the Municipality will undertake a Forest Renovation Program at the Lake Park. This program guarantees that buildings of any type will not be built in the park, but the following improvement takes place: reconstruct existing roads; restore the benches and reconstruct the paths; plant trees in the bare areas and undertake sanitary cut-offs; set up new plant species necessary to enrich biodiversity and to provide regulatory ecosystem services; set up a few children games (pickets and wooden toboggans) that do not alter the surface of the soil, do not affect trees and vegetation and are usually found beneath trees that do not allow grass growth; as well as create small children's parks in other areas of Tirana to meet the needs of the community.

This program is implemented once and not as a routine maintenance process for the park. It is a major revitalizing program of the park's ecosystem, for which the Municipality feels that people should make a financial contribution.

3.1 If you would be **required to contribute through a payment for the above program, would you be willing to pay**? **YES** **NO**
(*if the answer is YES, then continue with questions 3.2; 3.3 and 3.4)*

(if the answer is NO, then continue with question 3.5)

3.2 Which payment method would you prefer (answer if the answer of 3.1 is YES):

a) Single payment
b) Instalment payment

3.3 If your answer for 3.1 is YES, then:

a) What is the maximum in ALL you can pay as a family for the forest renewal program? _____lekë;
b) What would be the highest value you could pay if your financial status was not a problem? _____lekë.

3.4 What are the reasons that push you to be willing to pay (answer if the answer of 3.1 is YES)? *(choose only three: the first important one is marked by 1, the second by the importance of 2 and the third by 3)*

a) I think we need such programs to improve the forest; ☐
b) the fees we pay are not sufficient for these improvement programs; ☐
c) the services offered by the lake park are very much needed; ☐
d) there is urgent need for afforestation and storage to improve the quality of air in Tirana; ☐
e) I prefer that the forest be preserved as such and that there are no constructions, even for games - they should be made in other areas; ☐
f) I live close to the lake park; ☐
g) I can afford it economically; ☐
h) I think I am contributing to a fair cause; ☐
i) use the space for sport and want it to be just a forest ☐
j) other (specify) _____

3.5 What are the reasons why you do not pay for the park improvement program (answer if the answer to 3.1 is NO)? *(choose only three alternatives: the first important one is marked by 1, the second by the importance of 2 and the third by 3)*

a) it seems unjust for people to pay for such programs; ☐
b) I can not pronounce myself without knowing the program details; ☐
c) the taxes we pay must also cover these types of programs; ☐
d) I do not understand why I have to pay for having a tree park; ☐
e) I prefer the park to have constructions; the forest is of secondary importance; ☐
f) I do not think such programs work; ☐
g) I can not economically afford any kind of value; ☐
h) I do not trust the authorities that the citizens' payments will be used for the park and that the process will be transparent; ☐
i) other (specify)_____ _____ ☐

3.6 Do you pay the greening tariff?

a) Yes
b) No
c) I do not know

3.7 How much do you pay for greening (local tariff)? _____*lekë/year*
(only if the answer of 3.6 is PO)

IV. ABILITY TO PAY AND SOCIAL ASPECTS OF THE POPULATION

4.1 Where do you live *(street name or distance from the lake park)***?**

_____

4.2 Gender: a) female b) male

4.3 Age: a) 15-29 b) 30-40 c) 41-50 d) 51-60 e)+61 year

4.4 Education years?

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Primary				Secondary					High			University			Master		Phd or post-doctorate					

4.5 Children? a) YES b) NO

4.6 Pets (specify) _____? a) YES b) NO

4.7 Where do you belong in the following monthly income groups (net)?

a) No income;
b) My family takes care of me;
c) Economic aid, pension;
d) Up to 20,000 lekë;
e) 20,001 – 50,000 lekë;
f) 50,001 – 80,000 lekë;
g) 80,001 – 110,000 lekë;
h) 110,001 – 150,000 lekë;
i) above 150,001 lekë;

4.8 Active participation:

Activity	**YES**	**NO**
a) Are you currently member of an environmental association or urban activist?		
b) Have you contributed financially on issues related to environment in the past? If yes, define the value.	_____ *(value)*	
c) Have you voted in the last local elections?		

Notes

[1] The forest figure is based on Corine data for forest land cover between 2000 and 2012.

[2] Perrings refers to the following authors: Carpenter *et al.*, (2001), Bengtsson *et al.*, (2003), Scheffer *et al.*, (2001), Folke *et al.*, (2002), Webb and Levin, (2005).

[3] For instance the SESMAD variables explained latter in the text.

[4] Data from INSTAT (the Albanian Institute of Statistics) based on population census 2011.

[5] Authors cited by Elinor Ostrom in summarizing the participants' attributes include: Gilles and Jamtgaard (1981); Blomquist (1992); Ostrom (1990); sethi and Somanathan (1996); Cordel and McKean (1992); Anderson *et al.* (2003); Seabright (1993); Grima and Berkes (1989); Berkes (1992); Libecap (1989); Kanbur (1991); Ostrom (1992).

[6] Referring to Alexander & Penalver (2012), one of the distinctive features of property rights is their in rem quality, i.e. properties impose duties on everyone else to respect those rights, regardless of whether they participated in the respective transaction. The boundaries of the thing play a vital role in defining the scope of people's in rem duties to owners.

[7] Garcia-Lopez refers to a number of authors: Antinori and García-López (2008); Berkes (2008); Carlsson and Sandström (2008); Brondizio *et al.* (2009); Taylor (2010); Heikkila *et al*. (2011); Mwangi and Wardell (2012); Nagendra and Ostrom (2012); Young (2012); Carlsson and Sandström (2008); Bodin and Crona (2009); Benjamin et al. (2011); McGinnis (1999, 2011); Nagendra and Ostrom (2012).

[8] Maes et al. (2012) refer to various authors in summarizing resons to map ecosystem services: Naidoo and Ricketts (2006); Nelson *et al*. (2008); Lautenbach *et al.* (2011); Lavorel *et al*. (2011); Chan *et al*. (2006); Metzger *et al.* (2006); Naidoo *et al*. (2008); Luck *et al*. (2009); Chan *et al.* (2006); Egoh *et al*. (2009); Bai *et al*. (2011); Raudsepp-Hearne *et al*. (2010); Chisholm (2010); Li and Ren (2008); Harrison *et al*. (2010); Coiner *et al*. (2001); Naidoo and Adamowicz (2006); Termansen *et al.* (2008); Nelson *et al.* (2009); Burkhard *et al*. (2012a); Nedkov and Burkhard (2011); Willemen *et al*. (2012); Deng *et al*. (2011); O'Farrell *et al*. (2011); Gascoigne *et al.* (2011); La Notte *et al*. (2012); Chan *et al*. (2006); Egoh *et al*. (2011).

[9] United Nations Framework Convention on Climate Change

[10] The Economics of Ecosystems and Biodiversity – the initiative was launched by the Environment Department in 2007, aiming at contributing to the development of cost-effective conservation, facilitating sustainable forest use, policy responses and decisions, based on better information (Shoeibi et al., 2015)

[11] Forest Modeling and Information Systems – 2012.

[12] European State Forest Association - 2007

[13] Social-Ecological Systems Meta-Analysis Database, https://sesmad.dartmouth.edu

[14] Deriving directly from SESMAD variables.

[15] Selected among SESMAD variables

[16] Kanuni of Lekë Dukagjini is a summary of the norms, social codes and laws that regulated the life of the Albanians of the North for some hundreds of years, before Lekë Dukagjini was born, during his life and after his death, i.e. during the 15th century. The reason for taking his name is because it is thought that he was the first to summarise it in a written form. The version that I refer to in this text is a reprint of the publication of father Shtjefen Gjeçovi, which he prepared during 1010-1925, including also his own short biography and a foreword with instructions on how to read and understand the Kanun. The Kanun, as a book, has a social value and it is contains 12 "books" (chapters) and more than 1,200 articles. Beyond the Kanun of Lekë Dukagjini that regulated norms and ethics in the northern Albania, there are also other Kanun-s, such as that of Scanderbeg, of Labëria, etc.

[17] After the declaration of the independence from the Ottoman Empire and the creation of the first Albanian State.

[18] To date there are more than 250 users associations, covering the whole forest area of Albania.

[19] By previous local governments we mean those 373 local administrative units that existed in Albania during 2001-2015. These units were mainly corresponding to the micro-watersheds, and had also typically – especially in

the remote mountainous areas, a historical pattern of social-ecological relationships between citizens and between the community and natural resources.

[20] Albania has undergone a territorial-administrative reform in 2015 that resulted in the consolidation of 373 local governments into 61 municipalities. The previous LGs were smaller in size and those located in the mountainous areas were in many cases corresponding to micro-watersheds.

[21] The support means: an IBRD (International Bank for Reconstruction and Development) loan of 7.3 million EUR and a GEF (Global Environmental Facility) grant of 2.2 million EUR.

[22] This law has gone through several amendments since it was approved. This paper refers to all those amendments. The law amendments can be accessed in the Official Gazette of the Republic of Albania in www.qbz.gov.al. The respective sources are listed as follows, with the figures corresponding to the exact number of the official gazette, the respective page and year of publication: 56/1604/2006; 103/3001/2007; 150/7375/2008; 86/3775/2009; 18/747/2012; 30/1230/2013; 84/4665/2016.

[23] The area is calculated in GIS based on the specific data provided by the National Agency of Protected Areas for each specific area.

[24] "In 1985 the Corine programme was initiated in the European Union. Corine means 'coordination of information on the environment' and it was a prototype project working on many different environmental issues. The Corine databases and several of its programmes have been taken over by the EEA. One of these is an inventory of land cover in 44 classes, and presented as a cartographic product, at a scale of 1:100 000. This database is operationally available for most areas of Europe". (European Environment Agency, n.d.).

[25] Mediterranean macquis (in French) or macchia (in Italian) is a typical Mediterranean evergreen shrub land biome.

[26] Updated figures are absent, which makes it difficult to provide a value for 2017.

[27] The Monitoring process was undertaken in the frame of this research for 6 rivers, i.e. 3 basins, Shkumbin being one of them. 11 samples were analysed from the water of Shkumbin, taken in 11 different spots along the river. 13 physical and biochemical parameters were analysed in the laboratory per each sample, namely: pH, Light Transparency, Electric Conductivity, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Temperature, Biochemical Oxygen Demand (BOD), $N\text{-}NH_4$, $N\text{-}NO_3$, $N\text{-}NO_2$, Sulfides and Total Coliform). An analysis of heavy metals (Pb, Cd, Mn, Ni, Zn, Cu, Co, Cr, Hg, As, Ba, Br) was made for only two of the samples. These two samples were chosen for the proximity of the withdrawal location to two major industrial hot spots. The interpretation of the results was made by considering both, the Albanian standards and the EU standards.

[28] In 2014 NEA had monitored water samples from 4 locations, which were included in the 11 locations of the monitoring undertaken in the frame of this research. Furthermore, it was made sure to include in the analysis the parameters monitored by NEA: pH, dissolved oxygen (DO), BOD_5, $N\text{-}NH_4$, $N\text{-}NO_2$ and $N\text{-}NH_4$.

[29] Refer to Annex 5 for a complete overview of the values and standards. This table was compiled by the team preparing the Strategic Environmental Assessment for the territorial masterplans of 5 municipalities (Elbasan, Kuçovë, Fier, Lushnje and Berat) in Albania during 2015-2016 and was revised based on own research for the purpose of this thesis.

[30] The reference on norms is the Directive 2006/44/EC of 15 February 2006 concerning the management of bathing water quality and repealing Directive 78/659/EEC.

[31] Biological Oxygen Demand

[32] Referring to EU Directive 2006/44/EC

[33] Refer to annex 6 for a comparison with NEA values for 2015.

[34] May 2015.

[35] Heavy metals standards are withdrawn from the EU directive 2008/105/EC, transposed with the Decision of Council of Ministers no. 246/2014 "On the establishment of standards for the environmental quality of surface waters" and NIVA Për Përcaktimin e normave të cilësisë së mjedisit për ujërat sipërfaqësorë" dhe nga NIVA – Norwagian Institute for Water Research.

[36] Standards withdrawon from EU directive 2006/44/EC of 15 February 2006 concerning the management of bathing water quality and repealing Directive 78/659/EEC.

[37] The measuring device could not provide the exact coliform value, because it was set for a maximal value of 300 Cfu/100ml. There are different limit values that could be used as a reference (annex 6). In general a value of 200Cfu/100ml appears as a standard from different countries for waters of the second quality category, while the DIRECTIVE 2006/113/EC of The European Parlament and of The Council of 12 December 2006 on the quality required of shellfish waters provides a standard of less then 330CFu.

[38] According to NEA, the 1st category is very good or excellent quality; the 2nd category is good quality; the 3rd category is moderate quality; the 4th category is poor quality; and the 5th category is very poor or very bad quality (AKM, 2016).

[39] http://riverwatch.eu/en/balkanrivers/map, accessed on September 14, 2017.

[40] NEA reports in 2016 for 1,041,000ha of forests or 33% of the total territory of Albania and 400,000ha of pastures or 15% of the total territory of the country. However, in absence of a forest cadaster update, NEA also claims that the figures need adjustment because of being mainly an estimate. The total of forests and transitional woodland shrub as defined by Corine 2012 is 1,115,930 ha. It is higher than what is referred by NEA and it is not clear whether this is because the total area has continued to reduce from 2012 to 2016, or because of the use of different reference systems in the estimation. However, the ratio between Shkumbini basin forests (total area as per Corine 2012) and the total area of forests in Albania, whether based on Corine 2012 or NEA 2016, remains around 9%.

[41] As referred during the interviews and the focus groups.

[42] The name of the park is Shebenik-Jabllanicë.

[43] These are the two mountains, where river Shkumbin has its sources, in eastern Albania.

[44] As revealed from the interviews and focus groups.

[45] The figures were obtained from the Agency of Properties' Inventorying and Transfer in 2007-2008, as part of a cooperation between the Agency and Co-PLAN, Institute of Habitat Development, under the frame of the project "Making Policies Work – Program for Applied Public Policy Research", funded by Open Society Institute in Budapest.

[46] Based on Corine 2012 database.

[47] After the territorial and administrative reform that took place in 2015, each municipality is composed of a number of local units. The latter correspond with the number of local governments that were merged through the reform to establish the new municipalities. In the case of Pogradec there are 7 units and three of them fall within Shkumbini basin.

[48] This figure is based on the interviews and focus groups held with municipalities and forest commoners in the basin.

[49] This is the term used by commoners and municipal officials to address forests close to rural settlements and governed or owned in common before 1945.

[50] Measured as the ratio of the difference between those moving in and those moving out with the total residing population, given in 1,000 of inhabitants (INSTAT, 2015).

[51] The mapping of FUAs was made based on the INSTAT definitions of the Urban Cores, Urban Agglomerations and commuters' catchment areas in Albania. The data were derived from the Census 2011, including the 1km^2 grid (raster cells). The (base) maps were accessed through the ASIG platform on line. For the designation of the PUSH (potential urban strategic horizons) areas, the calculation of the 45 minutes (road public transport) isochrones from the FUA centre is made through own calculations on the Google map (Toto et al., 2015)

[52] "The size index is built on the prerequisite of polycentricity that there should be a distribution of large and small cities and that a polycentric urban system should not be dominated by one large city. The ideal rank-size distribution in a territory is log-linear and the flatter the rank-size distribution (regression line) is the more polycentric a region is. The indicators analysed are two – GDP per capita and population, and for both we calculate the slope of the regression line and the deviation of the largest city from it. The reason for using two

indicators is that the size is measured for both population and economy importance of the regions (FUAs)" (Toto et al., 2015); (Shutina et al., 2016, p.380).

[53] "To measure the connectivity index, we used the potential accessibility of FUAs, i.e. the potential accessibility that each urban core in a FUA has to the rest of the country (all the other FUAs). The potential accessibility of an urban centre is higher, the higher the population (or GDP) that it reaches in the other urban centres is and the fastest the reaching routes are (travel time used for travel costs). The slope of the potential accessibility regression line and the Gini coefficient are the two sub-indicators used on this regard. The two sub-indicators have a similar meaning: the flatter the regression line, the more accessible are lower-level centres compared to the primary city, and the lower the Gini coefficient, the less polarized is the distribution of accessibility" (Toto et al., 2015); (Shutina et al., 2016, p.380).

[54] "The location index assumes that a policentric urban system is one, where the main urban centers are equally spaced from each-other and not clustered in one small part of the country" (Toto et al., 2015); (Shutina et al., 2016, p.231).

[55] (1) – low relevant capacity; (2) – relevant capacity; (3) –medium relevant capacity; (4) high relevant capacity; (5) maximum capacity); (-1) – low relevant demand; (-2) – relevant demand; (-3) – medium relevant demand; (-4) – high relevant demand; (-5) – maximum demand (Burkhard & Muller, 2015).

[56] Fields denoted with 0 imply that supply and demand are equal and therefore neutralize each-other. Blank fields indicate land cover types with neither a relevant ES supply, nor a relevant demand for ES (Burkhard & Muller, 2015). Fields denoted with (-5) show that demand fully exceeds supply and there is a situation of undersupply; while fields denoted with (5) show that supply fully exceeds demand and there is a situation of oversupply (Burkhard & Muller, 2015, p.81).

[57] The supporting services – ecological integrity, are not included because for this set there are only supply assessments and no budgets of supply and demand.

[58] The law on protected areas has been amended in 2008 and a new law on protected areas has just initiated the approval procedure.

[59] Cooperative forests constitute a very minor % - invisible in the chart and existed only before 1990.

[60] Licensed rights were in place till June 2016, when a bylaw was passed by the Council of Ministers to reflect the forest moratorium law.

[61] This Decision of Council of Ministers is revoked in 2016 and replaced by the DCM no. 433.

[62] The text contains often a comparison between the legal procedure and the reporting from the field. Interviews and focus groups with municipal officials and forest users reveals the presence of an informal system of forest management that is in fact based on a commons' approach of forest governance.

[63] The Albanian word for family clan is "fis". Fis includes a number of families that share the family name and constitute the same family tree for generations, as long as this is remembered or recorded.

[64] Based on the SES framework, the SESMAD authors create three components: Governance System, which stands for Governance System in the SES frame as well; Environmental Common that merge Resource Systems and Resource Units from the SES framework; and Actors that stands for Users in the SES frame. According to SESMAD methodology, each variable falls under one component (further divided into sub-components) and each component has the following meaning:

"**Governance system:** A set of institutional arrangements (such as rules, policies, and governance activities) that are used by one or more actor groups to interact with and govern an environmental commons. Examples include the Montreal Protocol regime, the Great Barrier Reef Marine Park Act, and the International Convention for the Conservation of Atlantic Tunas" (SESMAD, 2014/b).

"**Actor group:** A group of actors, i.e. of individuals, organizations or nations that has developed a set of institutional arrangements in order to directly or indirectly interact an environmental commons. In our analysis we include groups whose members actually interact with each other (e.g. a particular management agency) as well as groups whose members may not interact very often if at all (e.g. fishermen who catch Bluefin tuna in the Atlantic Ocean)" (SESMAD, 2014/b).

"**Environmental commons:** An environmental phenomenon that is associated with the provision of important benefits to certain actor groups, and the use or production of which is also associated with negative extraction or

emission-based externalities. An environmental commons is the subject of governance for any case in the SESMAD project" (SESMAD, 2014/b).

[65] The World Bank approach