ALEKO MIHO

Department of Biology, WG Botany, Faculty of Natural Sciences, University of Tirana
e–mail: *aleko.miho@fshn.edu.al*

BUILDING ACTIVITIES WITHIN PROTECTED AREAS ARE OFTEN UNFRIENDLY AND UNSUSTAINABLE TO WETLAND CONSERVATION – ALBANIAN CASE

RIASSUNTO

Pare che il settore edile e l'(over)uso delle risorse naturali continuino ad essere la priorità in Albania al giorno d'oggi. Dopo il grave danneggiamento delle foreste (fino alla moratoria in vigore), altamente urbanizzata la zona costiera, l'energia idroelettrica (HPPs) sembra essere l'ultima risorsa non realmente utilizzata in tutte le sue capacità. I corsi fluviali, in pristine e not contaminate aree, e anche all'interno delle aree protette (PAs) sono l'ultimo traguardo, sotto lo slogan di energia 'rinnovabile', 'verde' o 'pulita'. Inoltre, non è una scelta del tutto saggia continuare con altri progetti di costruzione lungo la zona costiera, in particolare nella costa Adriatica (Velipoja, Patoku, Shen Pjetri, Golemi, Divjaka, Narta, ecc.), tra l'altro molte delle quali già protette! In effetti, queste aree remote ed incontaminate, incluse le PAs, sono di proprietà publica; costruire lì sembra non difficile, basta pagare alcune modeste commissioni per passare le procedure burocratiche! In questo senso le nostre risorse naturali sono in un certo senso 'orfane', ogni giorno esposti al rischio!

Durante il periodo 2005-2017 il Ministero dell'Energia e dell'Industria (MEI) ha dato il permesso di costruire all'incirca 500-550 HPPs (circa 18 HPPs/1000 km^2 !!!), piccoli e grandi, sparsi ovunque, con una capacità di generazione totale di circa 2,200 MW. Alcuni sono già costruiti; gli altri sono in costruzione o programmati per essere nel prossimo futuro. Considerare i nostri urgenti bisogni di energia, questo non sarebbe affatto male; in pochi anni l'Albania potrà essere davvero una superpotenza per l'energia idroelettrica. Ma circa 80-90 HPPs sono pianificati all'interno delle PAs o potenziali PAs, mettendo in pericolo i valori naturali, una delle caratteristiche più forti che ha già ereditato dal suo difficile passato.

Naturalmente la costruzione all'interno delle PAs non può essere considerata amichevole con la natura, quindi, in linea di principio, non può essere sostenibile. Perché si proteggono allora le PAs? Da quale attività dannosa, se non dalle attività di costruzione fatte dall'uomo? La maggior parte degli HPPs sono di piccola grandezza, solo 44 possono essere considerati importanti (con più di 10 MW);

tra questi, circa 17 progetti sono all'interno di PAs (Valbona, Curraj, Shala, Qarrishta), o potenziali PAs (Kalivaçi & Poçemi in Vjosa). Tale lista di 17 HPPs non potrebbe essere una "lista verde", ma una "lista rossa", una lista "not-go" per il governo albanese; la rispettiva capacità totale sarebbe di circa 535 MW, pari a circa il 24-25% della capacità di generazione totale pianificata. Possiamo salvarlo, al fine di conservare almeno una parte dei nostri valori naturali! Questo è il prezzo che la nostra società oggi deve pagare per la sostenibilità - bilanciare in armonia i bisogni sociali, economici e ambientali. Lo sviluppo sostenibile è un eccellente principio, abbastanza utile al giorno d'oggi, ma non senza costo. Se lo accettiamo tutti, dall'UE fino all'Albania (articolo 59 della Costituzione), dobbiamo tutti pensarci su, per trovare altre risorse energetiche (cioè energia solare, eolica, gas- o bio-, ecc.). O se no! Limitare l'uso (cioè ridurre l'uso improprio di energia), per soddisfare il dovuto principio! Tutto cio sarebbe strettamente legato alla nostra responsabilità di conservare, mantenere e ripristinare le nostre risorse naturali, non solo per noi oggi, ma anche per le generazioni future.

In relazione alla fascia verde sulle dune costiere e le delte fluviali, in particolare le pinete sulle dune e le foreste alluvionale e miste ripariale, tutti sono ecosistemi sensibili e fragili. D'altra parte, le dune costiere sono piuttosto importanti; situati tra la terra e il mare, aiutano a stabilizzare la costa, mitigano l'impatto del mare sulla costa e viceversa, conservando anche la qualità dell'acqua e della sabbia. Spesso tali habitat sono particolarmente protetti, rappresentando inoltre anche un paesaggio ancora più attraente, con alti valori turistici e recreativi. Si consiglia vivamente di rivedere la pianificazione dell'area costiera, per salvare dall'urbanizzazione ciò che è stata rimasta, in particolare le zone all'interno delle PAs.

Ecco perché il mondo accademico e gli ambientalisti contrastano tali decisioni sbagliate! No perchè appartengano alle persone "pazze" a cui piacerebe vivere circondati solo da una natura vergine, e accettare la povertà, ma forse appartengono alla più istruita parte della società che ha già alcune idee migliori sullo sviluppo. Ma la loro voce e resistenza purtroppo è ancora troppo debole! Anche la sensibilità pubblica e il movimento civile sono troppo deboli (proprio alla causa della caratteristica "orfana" dell'ambiente!); inoltre, spesso sono facilmente manipolati quando il governo, le ditte di costruzione o gli studi di esperti devono ottenere l'approvazione, anche nei casi più pazzi e non amichevoli dell'uso delle risorse naturali.

Cercare lo sviluppo economico in settori diversi sarebbe più sostenibile; accanto a HPPs, edilizia urbana e costiera, le cave e estrazione fluviale, ci si consiglia di fare sforzi anche per un'agricoltura moderna (compresa la coltivazione di piante industriali, silvicoltura, acquacoltura e ripopolamento ittico), industria alimentare e di elaborazzione, artigianato, turismo sostenibile, ecc. Naturalmente, tutto cio porterebbe creare più occupazione, ma allevierebbe anche il pesante carico che l'ambiente e le risorse naturali detengono oggi nell'economia albanese.

SUMMARY

It seems that the construction sector and the (over) use of natural resources continue to be the priority in Albanian development nowadays. After badly damaged the forests (up to the moratorium in vigor), highly urbanized the coastal area, hydropower (HPPs) seems to be the last resource, not really used in its all capacity. River courses, in very pristine areas and also within protected areas (PAs) are the last target, under the slogan of 'green', 'renewable' or 'clean' energy. Other construction projects along coastal area are not at all wise, too, especially in the Adriatic (Velipoja, Patoku, Shen Pjetri, Golemi, Divjaka, Narta, etc.), most of them already PAs! As matter of the fact, such remote pristine areas and also PAs are public property; it seams that building there is almost costless, only some modest fees to pass the bureaucratic procedures are needed! In that sense our natural resources are 'orphan', free exposed to risks every day!

During yrs. 2005-2017 the Ministry of Energy and Industry (MEI) gave permissions to build up to 500-550 HPPs (about 18 HPPs/1000 km^2!!!), small and big ones, sparse everywhere, with the total generation capacity about 2,200 MW. Some are already constructed; the others are under construction or planned to be in the near future. Considered from our strong needs for energy it is not bad; it will in few years Albania to be really a superpower in hydro-energy. But about 80-90 HPPs are planned within the PAs or potential PAs, endangering our natural values, one of the strongest features inherited from its difficult past.

Of course building within the PAs cannot be considered friendly with nature, hence, cannot be sustainable in principle. Why the PAs are protected? From what harmful events, if not from construction activities man made? Most of HPPs are small, only 44 can be considered important (with more than 10 MW); among this list, about 17 projects are planned within PAs (Valbona, Curraj, Shala, Qarrishta rivers), or potential PAs (Kalivaçi & Poçemi in Vjosa). Such list of 17 HPPs cannot be a 'green list', but a 'red list', a 'no-go' list for Albanian government; the total installing capacity of this 'no-go' list is about 535 MW, or about 24-25% of the planned total generation capacity. We can save it, in order to conserve at least some part of our natural values! This is the price our society has to pay for sustainability - successfully balance social, economic, and environmental needs. Sustainable development is a very good principle, often mentioned nowadays, but it is not without costs. If we all accept it, from the EU up to Albania (article 59 of the Constitution), we have all to think about it, to find other energy resources (i.e. solar, wind, gas or bio energy, etc.). Or if not! Restrict the use (i.e. reduce energy misuse), to fulfil the principle! It is closely linked to our responsibility to conserve, maintain and restore our natural resources, not only for us now, but even for the future generations.

Related with the coastal dunes and river deltas, in particular the Mediterranean coniferous forest belt and the Mediterranean alluvial and mixed riparian forests, all are sensitive, fragile ecosystems. On the other hand, coastal dunes are quite vital to the coast; situated in between the land and the sea, they help to stabilize

the coastline, mitigate the impact of the sea on the coast and vice versa, conserving also the quality of the water and of the sand. Often such habitats are specially protected, representing even a more attractive landscape, with high tourist and recreational values, too. It is strongly advised to review the coastal spatial planning, to save what is still safe from the urbanization, especially the zones within the PAs.

That's why the academic world and environmentalists contrast such wrong decision-makings! Not that they belong to the 'crazy' people who like to have virgin nature around, and accept the poverty, but perhaps they belong to the most educated part of society that have already some better ideas of development. But their voice and resistance unfortunately is still too weak! Also the public awareness and civil movement is also too weak (due to the 'orphan' feature of the environment!), and often easy manipulated when government, construction companies or expert studios need to get approval, even in such crazy and not friendly use of the natural resources.

Economic development across the whole sectors would be more sustainable, beside HPPs, urban and coastal construction, quarry and river mining, but also efforts to a modern agriculture (including industrial plant cultivation, forestry, aquaculture and fish restocking), food and processing industry, manufacturing, sustainable tourism, etc. It would bring more employment, but it will also alleviate the heavy burden that the natural environment and natural resources holds today in the Albanian economy.

Keywords: *HPPs development, protected areas, Albanian wetlands, sustainable development.*

INTRODUCTION

This paper is focused in sustainable development, mainly sustainable use of aquatic habitats in Albania, fluvial and coastal; the discussion will be focused mostly in nature conservation, especially in really protection of protected areas (PAs). The concepts of sustainable development *vs*. the protection of natural resources is often mentioned by the politics and decision-making during the last 20-25 years of so-called system transition in Albania, but not really implemented in practice; it seems that "*one hand does not know what the other hand is doing*!", as stated by Claue-Peter Hutter at 'Eco-twisters: Dossier on the European Environment' (1995).

Developing a good and sustainable strategy for the environment does require a high quality of expertise of course; but not really a complicated methodology and high amount of money are needed - something much simpler - a good spirit, a clear vision – if whether or not the concept of sustainability is accepted; more specifically in the Albanian case, if the natural resources (forests, rivers, coastal lagoons and dunes, medicinal plants, etc.) will be overexploited or something will be saved for the future life and generations! Sustainability must be basic for the Albanian development, too, just as it is sanctioned in the Constitution, and other

related laws and regulations. We teach it also to the students, future experts of conservation biology, and even to the school pupils. Sustainable development has not been born and elaborated in Albania, in a developing country, but from the experience of the developed countries (based also in their bad practices, too!); i.e. due to the not proper environmental assessments in the past, river engineering in industrialized countries has resulted in negative environmental impacts, with long-term trends, requiring expensive restoration measures; and nowadays it is forced more to Albania from EU tasks (Anonymous, 2016).

There is no doubt why most of us do not accept sustainability, especially when it comes to decision-making, because our society wants to develop as soon as possible, especially after years 1990, even paying every price! Often it is justified by the mentality of 'gaining the lost time'! It is why in the last few decades we have over-exploited, almost up to the end - forests, medicinal herbs, wildlife, fish, etc. It is also the reason for the blind, dark and dangerous pathway of the pyramids and cannabis! Due to the extreme historical poverty and lack of experience there is mostly based the short-sighted vision and the rampant decision-making throughout this period! Our economy is still based almost on the exploitation of unprocessed natural and biological resources. There is a scarce development of other important sectors of the economy (agriculture, industry, tourism, etc.) (Miho, 2017a; b).

The concern comes from some very significant facts: not only during the past 2-3 decades of system transition, but in the whole period of 60-70 years of development in Albania, the natural environment and its biodiversity are ignored in their sustainability; it is quite evident in: not controlled woodcutting, grazing and firing (result: 1 million ha forests destroyed - now in vigor a 10 years moratorium; Law 5/2016); illegal and not controlled hunting (now in vigor 2+5 years moratorium; Law 7/2014; Law 61/2016); not proper harvesting of aromatic and medicinal plants (300 plant species in the Red List; MoE, 2013); gravel mining in rivers; heavy urbanization and poor land use in the main urban and coastal zones, included in the agriculture land; excessive coastal land reclamation in 1960-70ies; heavy pollution from untreated wastewaters and bad management of solid wastes; etc. As it can be discussed, even Protected Areas (PAs) and other fragile ecosystems poorly known are nowadays not spared by building activities, HPPs, roads, so called tourist resorts, etc. It is obvious that all the mentioned concerns and restrictions are not without costs to the Albanian society today, and … also to the future generations!

Therefore, sustainable development, sustainable use of water resources, as well as the related best management practices in energy supply, landscape and urban ecology, proper land use, as well as in forestry, green architecture, green management practices, etc., are fundamental topics nowadays either on education or practical aspects for Albania (Miho, 2017a; b; Mullaj *et al.*, 2017). This paper aims to facilitate the understanding and awareness, wishing first in improving the vision in the difficult pathway of development, and stir up the discussion of experts and decision makers towards the balance between the economic development and sustainable use of natural resources in Albania.

MATERIAL AND METHODS

The material reported here is based in my experience as expert of water ecology and bioquality, and as teacher of botany for more than 30 years; it is also based in the experience and works of many colleagues in conservation biology (Albanian and international), and lessons learned in the field of Conservation Biology considering it as art and science; here the science is connected with practice and development. The paper represents a review what me and my colleagues have presented and discussed in common or separately in other scientific works or events and expert groups, or even in media: i.e. Miho *et al.* (2005) and Çullaj *et al.* (2005) about environmental state of some Albanian rivers of Western Adriatic Lowland; Miho *et al.* (2009) and Shuka *et al.* (2009) about hydrobiology of Bovilla reservoir, the most important drinking water supply of Tirana capital; Miho *et al.* (2013) about Albanian Coast and transitional waters; Miho *et al.* (2017) about construction and environment projects in Albania for the period 2016-17; Miho and Shuka (2017) about economical and conservation approach on the medicinal plants from Vjosa catchment; Diku *et al.* (2016; 2017) about the HPP development in Albanian Alps vs. biodiversity and habitat integrity; Mullaj *et al.* (2017) about green practices in Albania; UNEP (2000) about post-conflict environmental assessment in Albania; Shuka *et al.* (2017) about the conservation and threats of flora and vegetation of the Albanian Alps; EuroNature and RiwerWatch (2013) and Schwarz (2012; 2015) about Balkan Rivers - considered the Blue Heart of Europe; WWF (2014) about rivers of the Dinaric Arc, where the Vjosa River was in focus among the most valuable rivers of South-Eastern Europe; Shumka *et al.* (2010) about water life in rivers and the responses of possible hydropower construction; etc. It will be discussed also the heavy burden upon today's natural resources (waters, coastal belt, quarries, etc.) in Albania compared to other economic sectors (Miho *et al.*, 2017; Miho, 2017a; b; 2018).

RESULTS AND DISCUSSION

System of PAs in Albania: The World Database on Protected Areas (WDPA, 2017), the PAs cover more than 20% of the Albanian terrestrial and marine territory (ca. 540,000 ha), sparse in about 800 sites: 2 Strict Nature Reserve/Scientific Reserves (IUCN Category I) (4,800 ha); 15 National Parks (II) (210,500 ha); 750 Natural Monuments (III) (3,470 ha); 22 Managed Nature Reserves / Natural Parks (IV) (127,180 ha); 5 Protected Landscapes (V) (95,864 ha); 4 PAs of Managed Natural Resources (VI) (18,245 ha); 4 Regional Nature Parks (IV or V) (51,383 ha) (http://akzm.gov.al/). Until the 1990s, PAs were small in number and size, covering only 3.9% of the territory, mostly limited to forest ecosystems, natural monuments or game/hunting reserves (http://www.fao.org/). Actually the PAs are not only forest ecosystems and hunting reserves, but also other important natural ecosystems, i.e. river valleys, lakes and lagoons, and recently also marine eco-

systems. It is a significant progress made comparing with the past, but still too far if compared with other countries in the region; i.e. the terrestrial and marine PAs in Italy cover about 30% of the whole terrestrial and marine territory, or more than 36% in Greece (WDPA, 2017). But the progress made seems only formally, 'in paper' as we often say, for to protect really the nature and PAs in practice, for a developing country in economic transition like Albania, a lot of problems are evidenced during decades, and therefore a better vision and lot of joint efforts are still needed.

It is worth to mention that the PAs are declared as such for their high ecosystem integrity that is to their intact state, compared to other areas, for their high biodiversity, for rare and vulnerable habitats, and very sensitive to non-friendly human activities. PAs represent our minimal friendship with the nature; the minimal evidence of sustainability or sustainable use of natural resources - so much mentioned nowadays. For Albania, it is important to mention other areas where is 'no knowledge', not yet evaluated, but can be considered as potential future PAs, as it is the case of Albanian Alps, or River Vjosa. Therefore, the proper designation and management of PAs represent a constitutional obligation, meeting the requirements of many legal and sub legal acts that guarantee the protection of nature and biodiversity, in line with many international conventions and standards.

Albanian water resources in brief: Albania is among the top countries in Europe related to the water quantity per capita, up to 13,000 m^3 per inhabitant per year (Stanners and Bouredau, 1995). Wetlands cover a total surface of 970 km^2, equal to about 3% of the whole Albanian territory; more than 1300 aquatic sites are still scattered throughout the country: marine habitats, coastal lagoons, fluvial deltas, rivers, springs, lakes and ponds, and reservoirs (Mima *et al*, 2003; Miho *et al.*, 2013). Most of them shelter high diversity of sensitive habitats and biological species - rather poorly known and exposed to a significant impact of human activity. The three big trans-boundary lakes of Ohrid, Prespa and Shkodra are undoubtedly the most important and fascinating aquatic complexes, not only for Albania, but for the whole Balkan region. More than 90 karstic lakes (often smaller than 1 ha and shallower than 10 m), are loosely dispersed in regions with limestone or gypsum; the most famous are the lakes of Dumre (Peqini). In Central Albania (mountains of Lura, Ballgjaj, Dhoksi and Shebeniku) and in the Albanian Alps (Doberdoli, Jezerca), more than 130 glacial lakes are scattered at altitudes above 1500 m; most of them are small, formed on magma formations (ultra-basics), mainly oligotrophic and often located in beech or pine forests. In the whole country there are constructed more than 700 reservoirs (from 10 to 40 ha) used for flood control, irrigation, energy production, even drinking water supply and fisheries; the most important are the big reservoirs in the Drini cascade (Fierza, Komani, Vau Deja), Mati (Shkopeti and Uleza), Devolli (Banja), Bovilla, Bistrica, Thana, etc. More than 150 small rivers and torrents cross the country from the South-East to the North-West and enter the Western Adriatic Coastal Lowlands where they combine with the 8 big rivers: Buna, Drini, Mati, Ishmi, Erzeni, Shkumbini, Semani and Vjosa (Fig. 1). The combined total flow of

Figure 1. Hydrographic map of Albania modified after UNEP (2000) (Miho *et al.*, 2013).

Albanian rivers amounts to 1300 m/s, a significant amount of fresh water to the Adriatic Sea together with River Po in Italy (Kabo, 1990-1991; Miho *et al.,* 2013). Of course, most of PAs represent or shelter aquatic ecosystems.

It is worth to remember that aquatic habitats, provide a wide range of ecosystem services, important both in natural and economic aspects, properly listed by Varvaglione *et al*. (2006) especially for the transitory wetlands: as rich and sheltered habitats; as a reserve of biodiversity, maintaining freshwater, marine and brackish species in a very restricted space; as productive patches, supporting dense populations of birds and forming important habitat islands along migratory routes; important for the functioning of the biosphere – as unique places, where nitrogen compounds are reduced to molecular nitrogen and released back into the atmosphere, thus helping to maintain atmospheric composition over the last 400-500 million years; they filter the freshwater inputs, protecting the coastal environment and marine life; as nursery habitats for many fish species - important for fishing and aquaculture; etc. Moreover, the natural free flowing rivers, beside the maintenance of natural biodiversity, provide additionally the natural purification of water, vast groundwater aquifers for drinking water supply and agriculture, flood mitigation, etc. (Anonymous, 2016; Ward *et al.,* 1999; Reckendorfer *at al.,* 2013). Aquatic habitats are unique opportunities for recreation and tourism development; human societies have often developed around or inside waters; they are target sites for natural tourism but also unique places for cultural tourism, searching for early signs of human development; etc. (Varvaglione *et al*., 2006; Miho *et al.,* 2013). The significance of these ecosystem services has been recognized by EU policy (e.g. EU strategy to halt biodiversity loss by 2020, EU COM Green Infrastructure Initiative) and thus have also entered into regulations for environmental impact assessments (EIAs). Ecosystem services have been widely recognized as a useful tool for a holistic approach to solve multiple ecological and socio-economic challenges (Anonymous, 2016).

Sustainable development vs. nature conservation – HPPs in rivers: Rivers are the most important source of energy for Albania. After the INSTAT's data (http://www.instat.gov.al/), the domestic production of electric hydropower covered from 62% in yr. 2012 to 101% in yr. 2016 of the total consumption. Lazaj and Xhelilaj (2017) in their independent inventory have identified about 432 HPPs, 44 existing, 27 in constructing process and 361 planned to construct. In the Report No 7 of the Regional Strategy for Sustainable Hydropower in the Western Balkans (WBEC-REG-ENE-01, 2017) it is confirmed that during 'the period 2005-2015 the Albanian government has signed total of 184 concession contracts to the private investors for the construction of 505 HPPs with total generation capacity of about 2,200 MW; 114 plants with 280 MW capacity are already in operation, and 38 plants with capacity of 511 MW currently under construction; a significant number of these projects are below 10 MW size limit'. But the total number of HPPs is still not well known. During yrs. 2016 - 2017, National Environmental Agency (NEA) has reviewed additionally more than 55 hydropower projects (Miho *et al.,* 2017).

Use of water courses for hydropowers seems to be the last resource not really used in its all capacity in Albania. River courses, in very pristine areas and also within PAs are the last target; even the glacial lakes in high mountains (Lura, Ballgjaj and Dhoksi) are targeted. The investment in HPPs is considered promising, since it is green and renewable energy. Considered from our strong need for energy it is not bad; in few years Albania aim to be a really superpower in hydro-energy. But, it means that all the mountainous rivers and streams are already transformed, or planned to be transformed in construction sites, often in cascades of 3 or more HPPs! Hence, there are about 18 HPPs/1000 km^2, the highest in the whole region! Considering the cumulative impact in each river course, it is a heavy environmental burden. It seams that about 80-90 HPPs are planned within the PAs or potential PAs (Schwarz, 2012; 2015; Euronature and Riwerwatch, 2013; Lazaj and Xhelilaj, 2017; etc.), endangering our natural values, one of the strongest features Albania inherited from its difficult past. I can report some not friendly examples of HPPs in Albanian Alps, and in Vjosa River – the last one an example of 'no knowledge'. Other bad practices of hydropowers in other NPs are in Lura, Shebeniku-Jabllanica, Hotova-Dangellia, etc.

Let me list some harmful events to aquatic ecosystems from HPPs and other unfriendly construction activities: Ecosystem disturbs (by new roads, river dikes, tunnels, channels, explosives, transmission lines, etc.); Slope erosion (riparian, fragile slopes, etc.); Biodiversity disturbs, species, habitats (riverine, terrestrial); Biocorridor changes (invertebrates, fishes and other vertebrates); Water pollution from unfriendly urbanization, mining and quarries (pathogenic bacteria, nutrients, eutrophication and algal blooms, heavy metals, organic compounds); Microclimatic changes in the river ecosystem (evapotranspiration-humidity, air and water temperatures, etc.); etc.

The related environmental expertise is often superficial, general and not covering well all the natural aspects – almost missing the ecological concepts, synergic effects, biodiversity conservation, protected areas, etc. In addition it is the lack of data for all river courses, but also the lack or the weakness of the structures to control the implementation of the water use permit during operation. Moreover, the determination of the ecological flow in rivers is not very clear in Albanian acts, may be not professionally defined (Q350) for Albania, as a typical mountainous and Mediterranean country. Building activities within a PA often is quite slightly or even not mentioned in related EIA reports - about the main aims of the protected area, the biodiversity and habitat values, sustainability and zoning, the permitted and forbidden activities, etc. Even the related acts are not very clear about construction activities within PAs (Diku *et al*., 2016; Miho *et al*., 2017).

Examples of bad practices in Albanian Alps: Albanian Alps shelter intact areas of high natural integrity, like valleys of Valbona, Cemi, Shala, Çeremi, Gashi, and several small pristine tributaries. There are several PAs in Albanian Alps: the areas around Thethi (2,630 ha) and Valbona (8,000 ha) constitute two separate NPs (II),

declared since 1996 (http://akzm.gov.al/); Gashi river represent a Strict Nature Reserve (3,000 ha; I), declared recently as a World Heritage Site by UNESCO in July 2017, due to the presence of old, wild virgin Beech forest; there also two Regional Natural Parks (IV): Nikaj-Mertur, and Maranaj. PAs in Albanian Alps are proposed to be part of the Emerald Network (Areas of Special Conservation Interest designated under the Bern Convention), precursor to Natura 2000 network according to EU Habitats Directive (Diku *et al.*, 2016; Shuka *et al.*, 2017; etc.).

Moreover, the Agency of Protected Areas (NAPA or AKZM) has already planned to include all in the NP of Albanian Alps (Fig. 2); a Balkan Peace Park Project is working towards the formation of an international park together with Montenegro's Prokletije NP and Kosovo's Bjeshket e Namuna NP (https://thethiguide.com/balcan-peace-park-project/); the Balkan Peace Park will be one of the largest cross-border protected areas in the Balkans, extending on the single mountain range of the Accursed Mountains (the local names Prokletije or Bjeshket e Nemuna). On the other side, about 16 HPPs are contracted within the planned protected area (in Valbona, Gashi and Shala rivers): 8 plants are wholly within existing Valbona Valley NP (1996); the other 6 plants are downstream just outside park boundaries, but with ecological effects upstream (Diku *et al.*, 2016); two cascade plants (Ceremi and Dragobia), together referred to as the Dragobia Energy Project, with total 27 MW (WWF, 2017) have already started to construct, regardless the strong opposition of local and international environmentalists and experts.

Examples of bad practices in Vjosa river – 'no knowledge': Vjosa/Aoos is a trans-boundary river of 270 kilometers between Greece and Albania (190 km in Albania), with drainage area of 6,700 km² (4,365 km² in Albania). It discharges about 195 m³/s into the Adriatic Sea (oscillated 33 m³/s up to 237.6 m³/s) (Kabo, 1990-91) (Fig. 3). Vjosa is the last free flowing river in Europe, outside Russia (Schwarz, 2012; 2015; Euronature and Riwerwatch, 2013; WWF, 2014), and hence considered very important river by the scientists and other distinguished

Figure 2. Proposed Map for the National Park of the Albanian Alps (© Toka, 2016). The red circles show the location where some of HPPs are planned; two of them within the NP Valbona Valley have already started to constructs beside the strong opposition from the local community, as well as Albanian and international experts and environmentalists.

experts worldwide! The river itself is only partly known for its values of hydrology and biodiversity (Shumka *et al.*, 2018 sent for publication). However, several PAs are sheltered within the Vjosa catchment: Kardhiqi Strict Nature Reserve (Gjirokastra; 1,800 ha; Ist IUCN category); Hotova-Dangellia NP (Permeti; 34,361 ha; II); Managed Nature Reserve of Germenji-Sheleguri (430 ha; Erseka; IV); it is also Area of Special Conservation Interest (ASCI), potential Emerald site; Managed Nature Reserve of Pishe Poro (1,500 ha; Fieri; IV); 110 Natural monuments (III), i.e. Zhei, Viroi, Sotira, etc.; Semani delta-Vjosa delta (Pishe Poro) is proposed as CORINE Biotope and as Managed Nature Reserve; Vjosa delta-Narta lagoon is a Protected Landscape (Vlora; 19,738 ha; V) and also an Important Bird Area (IBA); just in front of Vjosa river mouth, Karaburuni-Sazani (Vlora; 12,600 ha; II) is declared a marine NP in 2010, unique in Albania. The Vjosa region is well known also for its cultural and historic values, as well.

In the other side, about 38 small and big hydropowers are contracted to the private investors in Vjosa River and its tributaries, some of them within the mentioned protected areas; few of them are constructed (Lengarica River cascade), others are under construction or planned to construct. The most influential for the River Vjosa corridor are the dams in Poçemi and Kalivaçi (Fig. 3), that will break the free flow of the river. The construction of Kalivaçi plant started 20 years ago through a concession given to an Italian company, but the project was not completed; the Albanian government announced again a Turkish-Albanian consortium as the winner in October 2017 (https://invest-in-albania.org/consortium-wins-bid-kalivac-hpp-vjosa-river/). Moreover, in May 2016 Albanian government granted a 35-year-concession to a Turkish company on the construction of Poçemi plant; but soon it was suspended by the Administrative Court in May 2017, due to invaluable the administrative acts (https://invest-in-albania.org/administrative-court-stops-hpp-construction-vjosa-river/).

Figure 3. Vjosa/Aoos catchment and its hydrographic network in Albania, where some of the planned HPPs are labeled with red.

What can we save - the red list of HPPs! Based in the Regional Strategy for Sustainable Hydropower in the Western Balkans (WBEC-REG-ENE-01, 2017), most of HPPs are small, only 44 can be considered important (with more than 10 MW). Among that list, about 17 projects are within PAs (Valbona, Curraj, Shala, Qarrishta rivers), or potential PAs (Kalivaçi & Poçemi in Vjosa). Such list of 17 HPPs and other small HPPs planned to construct within PAs cannot be a 'green list' for Albanian government, but a 'red list', a 'no-go' list; the total installing capacity of this 'no-go' list is about 535 MW, or about 24-25% of the total planned generation capacity of 2200 MW, mentioned above. Therefore, the academic experts (Albanian and international) strongly suggest stop building, in order to conserve at least some part of our natural values! It is the price our society has to pay for sustainability - successfully balance social, economic, and environmental needs. Sustainable development is a very good principle; even politics mention it often nowadays; but it is not without costs. If we all accept it, from the EU up to Albanian Constitution, we have all to think about it, to find other energy resources (i.e. solar, wind, gas or bio energy, etc.). Or if not! Restrict the use (i.e. reduce energy misuse), to fulfil the principle! It is closely linked to our responsibility to conserve, maintain and restore our natural resources, not only for us now, but even for the future generations**.**

More balanced energy suppliers is more sustainable for the natural environment and society! It is calculated that more than 2100 kvh/m^2/year reach Albania from the sun, equal to more than 300 sunny days in one year. Why not to suggest investing in sun energy in future development programs? Gas Trans Adriatic Pipeline (TAP) will reach soon Albania (https://www.tap-ag.com/); beside the strong opposition from the environmentalists, Vlora gas-fired thermo power plant (130 million US$), with the estimated total capacity of 100 MW, was constructed in Vlora as solution in year 2010; but it is not in use since the beginning! Why not to consider it again as an alternate energy in our future plans?! Why not consider also other/alternate energy sources? i.e. wind, biofuel, etc.

Be in line with EU Reports! The EU Reports for Albania always emphasized to save the pristine rivers from hydropower projects, especially in PAs, specifically repeated in April 2015, April 2016, November 2016 and February 2017. In February 2017, the European Parliament explicitly criticized the Albanian government in regards to its hydropower policies, demanding a National Park for Vjosa and stop to HPP projects. 'It is true that Albania needs energy and more development, but that should not be done by destroying nature', told the Vice President of the EP, U. Lunacek, the Albanian journalists in Brussels in 14 April 2017.

Coastal wetlands, dunes and river deltas: Albania is a coastal country with a coastline of about 427 km, of which 273 km belongs to the flat Adriatic coast and 154 km to the rocky Ionian coast. Strong currents in the sea move the water

along the coast; in summer large masses flow from the Greek Ionian Sea into the Adriatic, while Adriatic water exits mainly along the Apulian coastline (Kabo, 1990-91). About 30% of the surface of the Albanian PAs belong to the coastal zone. Despite reclamation for agricultural purposes during 1960ies, Albania still has about 950 km^2 transitional or related areas, where about 400 km^2 are wetlands and lagoons. Three large RAMSAR areas: Butrinti-Çuka-Stillo, Karavasta-Divjaka and Lake Shkodra-River Buna-Velipoja, represent distinct transitional values. Furthermore the Butrinti and the Divjaka-Karavasta complexes are National Parks (II). Five sites have been denoted as Managed Nature Reserves (IV): Kune-Vaini-Tale, Pishe Poro (Fieri), Rreza-Karaburuni Penninsula, Patoku-Fushe Kuqe-Ishmi and Rrushkulli. The River Buna-Velipoja and the delta of the River Vjosa-Narta lagoon have been declared as Protected Landscape Areas (V). All these habitats are distinguished by their wealth of breeding and refuge habitats for flora and fauna, especially for fish and wintering or migratory aquatic birds, some of them globally endangered (Miho *et al*., 2013; Kashta *et al.*, 2010; Mima *et al*., 2006; http://akzm.gov.al/).

Related with the coastal dunes and river deltas, in particular the Mediterranean coniferous forest and the Mediterranean alluvial and mixed riparian forests, all are sensitive, fragile ecosystems. It represented an almost continuous coniferous forest on coastal dunes of Adriatic coast, which was partly natural and partly planted 60 – 70 years ago. The coniferous belt is very important for sandy dune stabilization and to protect arable land. Moreover, it is now a feature of many Mediterranean coastlines and currently they represent habitats with priority status, included in Annex I to Directive 92/43/EEC (Mullaj *et al*., 2017). However, all these habitats are quite vital to the coast; situated in between the land and the sea, they help to stabilize the coastline, mitigate the impact of the sea on the coast and vice versa, conserving also the quality of the water and of the sand. Hence, most of them are specially protected. Moreover, all these coastal zones represent an even more attractive landscape, with high tourist and recreational values, too (Miho *et al*., 2013).

Important features of Albanian coastline are the submerged meadows of *Posidonia oceanica*, an endemic grass in Mediterranean; they are prevalent along the shores of the Ionian coast, and only in some limited parts of the Adriatic coast of Vlora, Durresi and Rodoni (Kashta *et al*., 2005; 2010; Miho *et al*., 2013). These marine habitats are very valuable for sheltering, feeding and wintering of many organisms, i.e. invertebrates, fish and other marine animals. *Posidonia* meadows are very sensitive to the pollution discharged by rivers or other unfriendly human activities, i.e. uncontrolled construction along the coast, unsustainable fishing or aquaculture.

Miho *et al.* (2013) give an overview of the human impact along tha albanian coastal zone. Since most of them still endager nowdays, let me mention them after a certain priority: 1) the intense urbanization and tourism (Fig. 4), especially in some coastal areas of the Adriatic, where the most inhabited and industrial cent-

ers are situated, i.e. Velipoja, Shengjini, Lalzi Bay, Golemi, Vlora, Orikumi, Himara, Saranda and Ksamili; 2) coastal pollution due to the scarce waste management along the coast and in all river watersheds; beside some progress achieved in Durresi, Kavaja and Vlora, the urban wastewater and other industrial wastes are collected directly in rivers and transported without any treatment to the sea; increasing energetic and harbor activities can be also added to this; 3) poor land use practices in watershed areas, like deforestation, excessive grazing, fires, gravel mining in river beds, mines and quarries, unfriendly construction of roads, HPPs, industrial works, etc. enhance the erosion and related pollution mentioned above, causing adverse effects into the coastal and marine habitats; 4) overfishing and often not controlled hunting; 5) still the limited authority of governmental bodies, combined with low education and low public awareness and education on environmental and nature protection towards the new development in Albania.

All of them separately or in synergy still have serious consequences for plant and animal biodiversity, but also for the stability of the dunes and the coastline, and of course for the humans, the life quality and health security. Hence, it is strongly advised to check carefully the coastal territory planning (sustainable); urbanization should avoid the sandy dunes and their forests, especially in sensitive areas of the coastline, as well as along the areas that host high diversity of plants and animals, such as Velipoja Reserve (Buna delta), surrounding lagoons of Lezha (Kune-Vaini), Patoku-Fushe Kuqe, Divjaka-Karavasta, in the area of Semani (Darezeza) and Vlora (Soda-Narta-Zverneci). Natural restoration and tree planting (mostly pines) should be promoted. Moreover, it is strongly advisable to strictly protect *Posidonia* meadows, prohibiting any activity with adverse impacts in its natural growth, related with heavy erosion and pollution from the rivers. Al-

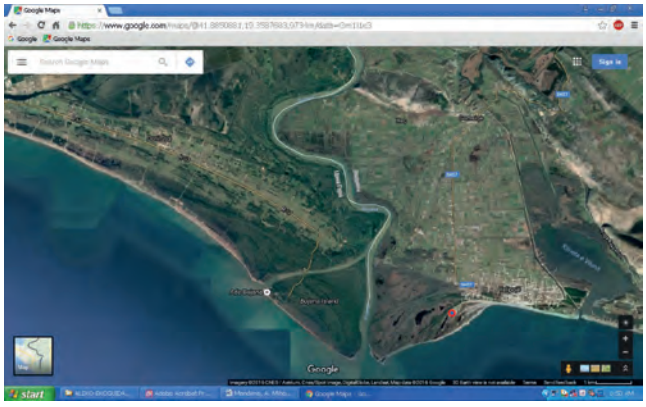

Figure 4. View of the cross-border area of the Buna Delta, where two opposite scenarios of land use clearly appear between Montenegrin part (*left*) and Albanian part (*right*)! The red circle shows the location where the next resort is builded just within the Velipoja Reserve (IV), already a RAMSAR site, too!

ways alert to the strict enforcement of respective laws on fishery and aquaculture (Law 64/2012 and Law 103/2016) (Mullaj *et al.,* 2017; Miho *et al.,* 2013; 2017).

Albanian development continues to be based mainly in the construction sector and the use of natural resources: During February 2016 - May 2017, the EIA Commission in NEA has reviewed more than 440 EIA reports about construction projects spread all over the country (Miho *et al.,* 2017), grouped in figure 5. From a general view, it is noted that the use of natural resources is the most important - over 120 projects or 28% of all projects reviewed - specifically quarries, mines, river mining, HPPs, etc. Moreover, the construction sector continues to be important (about 75 projects or 17%) too.

It must be stressed that natural resources are not infinite, some are renewable (forests, aromatic herbs, fish and mollusks etc.); most of them, when improperly used, restore with great difficulty and high costs, but others are not renewable, i.e. minerals, marble rocks, natural oil and gas, etc. Hence, it is very important that the permitting to use must be with responsibility and professionalism, taking always into account their friendly use.

The natural resources are still 'orphan', free exposed to risks: There is some progress made in Albania, dealing with the administration and protection natural resources, including waters, either in administration bodies and legal acts as well. Ministry of Tourism and Environment (MTE or MTM; http://turizmi.gov.al/) is the most important body, and its subordinate institutions: National Environment Agency (NEA or AKM; http://akm.gov.al/), National Agency of Protected Areas (NAPA or AKZM; http://akzm.gov.al/), the Central Inspectorate of Environment and Forests (CIEF or IQMP; http://www.insq.gov.al/), National Agency of the Coast (NAC or AKB; http://www.bregdeti.gov.al/), and their subordinate directorates in different counties. Another important institution is the National Agency of Natural Resources (NANR or AKBN; http://www.akbn.gov.al/) beside the Ministry of Infrastructure and Energy (MIE; http://www.energjia.gov.al/).

Despite that it seems that the natural resources are free exposed to risks everyday, beside the article 59 of the present Constitution for a 'sustainable use of environmental resources'. As above explained, new building projects deal with the last survived rests of our natural resources - river courses and pristine spots of PAs and other pristine areas with almost 'no knowledge'! As matter of the fact, such remote pristine areas and also other PAs are of public property; building there is almost costless, only some modest fees to pass the bureaucratic procedures are needed! The decision making does not recognize also potential PAs. Let me mention the last concern since April 2017 about a touristic resort expected to be built inside the Divjaka-Karavasta NP, with about 370 villas and 2350 apartments (https://exit.al/en/2017/04/07/why-we-shouldnt-build-a-resort-in-karavasta/).

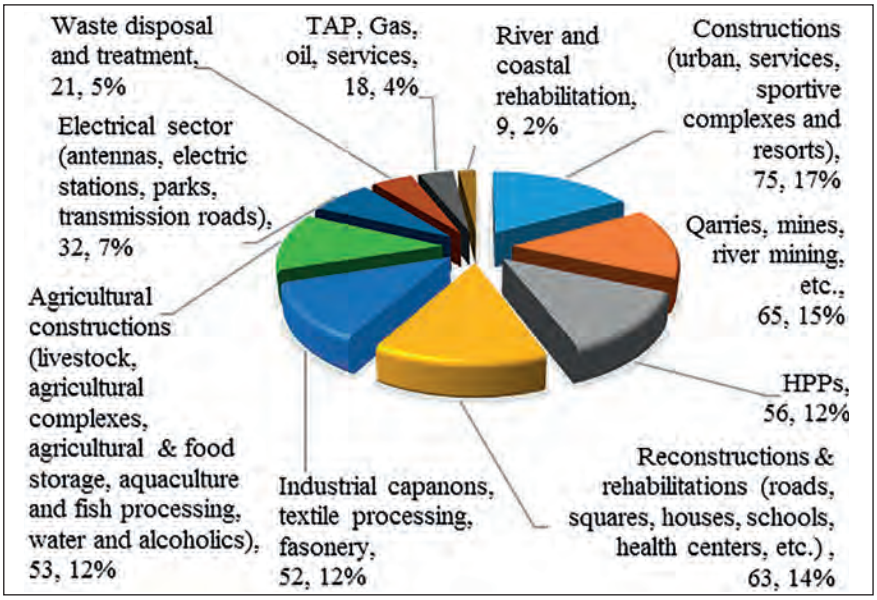

Figure 5. Summary of EIAs reviewed in the related NEA Commission, during 2016-2017 (total number and percentiles) (Miho *et al*., 2017)

A better vision is strongly recommended, both in terms of sustainable development and friendly use of natural resources (aquatic, biological, mining, etc.), but also in the prevention and safety of the human health itself. In my opinion, legal acts often are not bad, though they even reflect the shortcomings of an unhealthy vision, and hence they need continuous refinement. On the other hand, their effectiveness and especially their proper implementation depend strongly from a proper and healthy environmental vision! It might be that the responsibility is shared among to many institutions, or the right vision and cooperation among the abovementioned institutions can be better!

Let me give an example: Tourism is a 'User' sector of the Environment and its resources or services, as it is the Agriculture, Energetic, Industry, etc. Tourism can be friendly to the environment, as it can be for the other 'Users', in a normal case. If considering the urban development in the coastal area above mentioned, Albania is an excellent example of unfriendly tourism or even harmful to the natural environment; and not to ignore that the quality of human life and health is threatened too! The waters and other natural resources, before being energy, agricultural or touristic assets, etc., may provide a wide other ecosystem services as mentioned above, and their use should be well-coordinated and agreed upon with the Ministry of Environment and its responsible subordinate bodies first. The permission cannot be *a priori* issued first by the environmental 'user' ministries as it happens now; the 'user' bodies are more connected with exploitation, economical profit, often instantaneous profit.

Hence, it is strongly recommended the revision and strict application of Strategic Environmental Assessment, for the construction plans in rivers, in the dune belt, in PAs, and also for the use of forests, aromatic plants, the urban use of agricultural land, etc. It is strongly advised to review the coastal spatial planning, to save what is still safe from the urbanization, especially the parts within the PAs. Revise/prepare and adopt a proper Strategic Plan for Hydroenergy, based first in the PA map! It is strongly recommended to exclude every building project and other unfriendly activity from PAs! Efforts to recognize also potential PAs, their natural values, before their exploitation! Better informing and including the public in the planning process!

Ministry of Environment must have more and independent legal power: In my opinion the MTE, it Environmental line, as directly responsible, to both the management and also the preservation of natural resources, must have more influence and legal power (Miho, 2018). I would suggest that even the NANR (AKBN) should change the affiliation to Ministry of Environment; likewise, the State Water Inspectorate, Water Basin Agencies, the Institute of Geosciences, Energy, Water and Environment, the Albanian Geological Service, etc.; all them are unique institutes focused in assessment of natural values.

Improve the quality of the EIA reports: Environmental Impact Assessment according to EU standards is strongly recommended! Ministry of Environment must check the quality of the expert list and their studios, their licensing and continuous qualification; NEA must strengthen the filter towards EIAs not in standard, and related EIA experts and studios; alert in delivering Environmental permits; NAPA & NEA must be always alert in the conservation of PAs and other fragile ecosystems.

The sustainable way is better! Why experts and environmentalist oppose such existing wrong decision-making? Not that they would like to live in a virgin nature around, and accept the poverty, but they accept sustainability, some better ideas of development; unfortunately, this voice and resistance is still too weak in Albania! Also the public awareness and civil movement is also too weak (due to the 'orphan' feature of environment!), and often easy manipulated when government, construction companies or expert studios need to get approval, even in such crazy and unfriendly use of the natural resources.

Do not forget the past! Do not forget the slogan in 1970ies: 'to qepemi kodrave dhe maleve dhe t'i bejme ato pjellore si dhe fushat – *let's climb up the hills and mountains and turn them fertile as well as the fields*'; the forest loss started since the extreme extension of agriculture in the past decades (up to the 1990s), with land reclamation, deforestation and terracing for agricultural land, up to the most fragile hilly, often mountainous slopes. Not surprisingly, Albania is now classified as a country with high erosion and land loss, distinct for the irregular climate

changes and flooding. It was the first among unfriendly activities that led to the nowadays of two Moratoria in Forests and Hunting, of course not without costs for the society today.

Last considerations! Economic development across the whole economical sectors is more sustainable, beside HPPs, urban construction, mining and quarrying, but also efforts to a modern agriculture (including industrial plant cultivation, forestry, aquaculture and fish restocking), food and processing industry, manufacturing, sustainable tourism, etc. It would bring more employment, but it will also alleviate the heavy burden that the natural environment and natural resources holds today in the Albanian economy.

ACKNOWLEDGMENTS

Congratulations and many thanks to the organizers of Alblakes 3 – the International Conference on Sustainable Water Resources Management, held at Faculty of Natural Sciences, University 'A. Xhuvani', Elbasani, Albania, 20-22 October, 2017. Gratitude to the editorial board of *Thalassia Salentina* journal, University of Salento, Italy, for publishing the final volume of the Conference proceedings.

REFERENCES

Anonymous, 2016 – Memorandum - Research requirements for a sustainable development of the Vjosa River corridor. The Vjosa Science Conference: *The Vjosa – A unique opportunity for European River Science*. Faculty of Natural Sciences, University of Tirana, Albania, June 8, 2016. http://balkanrivers.net/sites/default/files/pictures/Memorandum%20Vjosa%20Juni%202016.pdf

Çullaj A., Hasko A., Miho A., Schanz F., Brandl H., Bachofen R., 2005: The quality of Albanian natural waters and the human impact (Review article). *Environment International*, 31: 133-146 (www.sciencedirect.com)

Diku A., Paparisto A., Miho A., Bohne C., Mahmutaj E., Bego F., Shuka L., Nika O., Hoda P., Shumka S., 2016; 2017 – HPPs development in Albanian Alps vs. biodiversity and habitat integrity – Valbona valley case. Second International Conference on '*Biotechnology in Agriculture*', Agricultural University of Tirana, ALBANIA, April 18-19, 2017, Abstract book, 8. https://sites.google.com/a/ubt.edu.al/ajas/; full text in https://www.researchgate.net/publication/301765216_Veshtrim_i_pavarur_lidhur_me_ndertimin_e_HEC-eve_ne_Luginen_e_Valbones

EuroNature and RiwerWatch (Ed.), 2013: Outstanding Balkan River landscapes – a basis for wise development decisions. *FLUVIUS Floodplain Ecology and River Basin Management*, Vienna, December 2013. 20 pp. http://www.balkanrivers.net/sites/default/files/AL_CountrySpecial14[smallpdf.com].pdf

Kabo M. (Ed.), 1990–91 – *Gjeografia Fizike e Shqipërisë*, Vol. I (400 pp.) dhe II (590 pp.). Albanian Academy of Sciences. Geographic Centre, Tirana.

Kashta L., Beqiraj S., Mato Xh., Xhulaj M., Gaçe A., Mullaj A., 2005 – *Marine underwater meadows – green lungs of the Mediterranean*. APAWA, Ed. Julvin 2. Tirana: 48 pp. 2005. (in Albanian)

Kashta L., Zuna V., Dodbiba E., Beqiraj S., Kromidha G., Koçu E., Zotaj A., Tilot V., Burgt N., 2010 – *Protected area gap assessment marine biodiversity and legislation on marine protected areas. / Vlerësimi i mangësive në zonat e mbrojtura, biodiversiteti detar dhe legjislacioni për zonat e mbrojtura detare*. Ed. MMPAU, GEF, UNDP Albania, Tirana: 150 pp (in English and in Albanian).

Law 103/2016 – *Për akuakulturën*. https://www.parlament.al/wp-content/uploads/2016/10/ligj-nr.-103-dt.-20.10.2016.pdf

Law 5/2016 (I Ndryshuar) – *Per shpalljen e moratoriumit ne pyje ne Republiken e Shqiperise*. http://www.ikub.al/ligje_category/16/02/18/PeR-SHPALLJEN-E-MORATORIUMIT-Ne-PYJE-Ne-REPUBLIKeN-E-SHQIPeRISe-0189.aspx

Law 61/2016 – *Për shpalljen e Moratoriumit të Gjuetisë në Republikën e Shqipërisë*. https://www.parlament.al/wp-content/uploads/2016/06/ligj-nr.-61-dt.-2.6.2016.pdf

Law 64/2012 – *Për peshkimin*. www.ligjet.org

Law 7/2014 – *Për Shpalljen e Moratoriumit të Gjuetisë në Republikën e Shqipërisë*. www.mjedisi.gov.al/.../Ligj_7-2014_30_01_20_14_per_moratoriu...

Lazaj L., Xhelilaj R., 2017 – Mapping of hydropower plant in Albania, using Geographic Information System. HELP-CSO project final report. EcoAlbania, Miliekontakt Albania and LexFerenda: 38 pp. http://www.ecoalbania.org/wp-content/uploads/2017/05/HPPs_al_final-report_me-kapak.pdf

Miho A., Çobani E., Koto R., Shallari S., 2017 – Projektet ndërtimore dhe mjedisi në Shqipëri për periudhën 2016-17. *Buletini i Shkencave Natyrore* (BShN), FShN, UT, Vol. 24: 14-24. https://sites.google.com/a/fshn.edu.al/fshn/home/botimi-nr-24-viti-2018?pli=1

Miho A., Çullaj A., Bachofen R. (eds.), 2009 – *Bovilla(Albania) – Limnological Study / Studim Limnologjik*. Julvin 2, Tiranë: 350 pp. ISBN 978-99956-14-29-4 http://www.fshn.edu.al/home/publikime-shkencore

Miho A., Kashta L., Beqiraj S., 2013 – *Between the Land and the Sea - Ecoguide to discover the transitional waters of Albania*. Julvin 2, Tiranë. 462 pp. ISBN 978-9928-137-27-2. http://www.fshn.edu.al/home/publikime-shkencore

Miho A., Shuka L., 2017 – Medicinal plants in Vjosa catchment, economical and conservation approach. Alblakes3 2017: International Conference on *Sustainable Water Resources Management*, Elbasani, Albania, 20-22 October, 2017. Book of Abstracts: 17-18. https://www.researchgate.net/publication/320566550_Medicinal_plants_in_Vjosa_catchment_economical_and_conservation_approach

Miho A., Çullaj A., Hasko A., Lazo P., Kupe L., Schanz F., Brandl H., Bachofen R., Baraj B., 2005 – *Gjendja mjedisore e disa lumenjve të Ultësirës Adriatike Shqiptare. / Environmental state of some rivers of Albanian Adriatic Lowland*. Tirana University, Faculty of Natural Sciences, Tirana (In Albanian with a summary in English): 267 pp. ISBN 99943-681-9-2. http://www.fshn.edu.al/home/publikime-shkencore

Miho A., 2017a – HEC-et / Shkatërruesit e biodiversitetit të lumenjve, nuk duhet të shihen si burimi i vetëm i energjisë. Posted on June 19, 2017 by *CitizensChannel in Mjedisi*, Opinion. https://citizens-channel.com/2017/06/19/hec-et-shkaterruesit-e-biodiversitetit-te-lumenjve/

Miho A., 2017b – Zhvillim i qëndrueshëm, jo 'të dalë ku të dalë' – në shënjestër HEC-et. Qershor 21, 2017. *Ecoalbania*, Njoftime për shtyp. http://www.ecoalbania.org/zhvil-

lim-i-qendrueshem-jo-te-dale-ku-te-dale-ne-shenjester-hec-et/

Miho A., 2018 – Ndërtimi i HEC-eve me vend e pa vend. Opinion, botuar në *Gazeta Shqiptare,* në 19.02.2018 http://www.gsh.al/2018/02/19/ndertimi-hec-eve-vend-e-pa-vend-barre-e-rende-mjedisore-dhe-per-zhvillimin-e-vendit/

Mima M., Fitoka N. E., Bego F. (Eds.), 2003 – *Inventarizimi i ligatinave shqiptare*. ECAT Tirana & EKBY. Thermi, Greece: 130 pp. + 75 pp. Annexes (in Albanian, Greek and English).

MoE, 2013 – *Për miratimin e listës së kuqe të florës dhe faunës së egër*. Urdhëri 1280. dt 20.11.2013. (Red List of fauna species of Albania). Tirana. http://extwprlegs1.fao.org/docs/pdf/alb144233.pdf

Mullaj A., Hoda P., Shuka L., Miho A., Bego F., Qirjo M., 2017 – About green development in Albania. *Albanian j. agric. sci., Special edition,* Agricultural University of Tirana, ALBANIA: 31-50. https://sites.google.com/a/ubt.edu.al/rssb/biotech_2

Reckendorfer W., Funk A., Gschoepf C., Hein T., Schiemer F., 2013 – Aquatic ecosystem functions of an isolated floodplain and their implications for flood retention and management. *Journal of Applied Ecology* 50(1): 119-128. DOI10.1111/1365-2664.12029

Schwarz U., 2012 – Balkan Rivers – *The Blue Heart of Europe. Hydromorphological Status and Dam Projects for ECA Watch Austria/Euronature Germany/MAVA Switzerland,* 150 pp. and 101 pp. Separate Annex (River Catalogue). Vienna. http://www.balkanrivers.net/sites/default/files/BalkanRiverAssessment29032012web.pdf

Schwarz U., 2015 – *Hydropower Projects on the Balkan Rivers – Update*. RiverWatch & EuroNatur, 33 pp. http://balkanrivers.net/sites/default/files/Hydropower%20dams%20in%20the%20Balkan230915_FINAL_EdUS.pdf

Shuka L., Mullaj A., Hoda P., Kashta L., Miho A., 2017 – Overview of the flora and vegetation of the Albanian Alps - the degree of conservation and threats. 37th Meeting of *Eastern Alpine and Dinaric Society for Vegetation Ecology (EADSVE)* – Prizreni, Kosovo, 13 -16 July 2017. Book of Abstracts (Eds.) F. Millaku, N. Berisha, E. Krasniqi. (ISBN: 978-9951-672-08-5): 18. http://www.eadsve.org/

Shuka L., Çullaj A., Shumka S., Miho A., Duka S., Bachofen R., 2009 – Response of Drinking-Water Reservoir Ecosystems to Anthropogenic Impacts in Albania: Trends of Interrelationship. *J. Int. Environmental Application & Science,* Vol. 4(4): 477-485 http://www.jieas.com/volumes/vol091-4/abs09-v4-i4-16.pdf

Shumka S., Shuka L., Mali S., 2010 – Rivers Water Life and the Responses of Possible Hydropower's to be Constructed in the Water Courses of Vjosa, Semani and Drini in Albania. *BALWOIS* 2010 - Ohrid, Republic of Macedonia - 25, 29 May 2010. 8 pp. https://www.researchgate.net/publication/242744304_Rivers_Water_Life_and_the_Responses_of_Possible_Hydropower%27s_to_be_Constructed_in_the_Water_Courses_of_Vjosa_Semani_and_Drini_in_Albania?isFromSharing=1

Shumka S., Bego F., Beqiraj S, Paparisto A., Kashta L., Miho A., Nika O., Marka J., Shuka L. (2018) – Current knowledge of biodiversity in Vjosa River system - counting threats that jeopardize species and ecosystems survival. *Acta ZooBot Austria* (sent for publication)

Stanners D., Bourdeau Ph. (eds.), 1995 – Rivers, reservoirs and lakes. *Europe's environment*. Copenhagen. European Environment Agency.

UNEP (Ed.), 2000 – *Post-Conflict Environmental Assessment – Albania*. United Nations Environment Programme, Nairobi, Kenya: 80 pp. http://enrin.grida.no/htmls/albania/reports/postcon/eng/7.htm

VARVAGLIONE B., SABETTA L., BASSET A., 2006 – *Tra Terra e Mare: Ecoguida alla scoperta delle lagune e di laghi costieri in Puglia*. Universita degli Studi di Lecce. 152 pp. http://siba-ese.unisalento.it/

WARD J.V., Tockner K., Schiemer F., 1999 – Biodiversity of floodplain river ecosystems: ecotones and connectivity1. Regul. Rivers: Res. Mgmt., 15: 125–139. doi: 10.1002/(SICI)1099-1646(199901/06)15:1/3<125::AID-RRR523>3.0.CO;2-E

WBEC-REG-ENE-01, 2017 – Regional Strategy for Sustainable Hydropower in the Western Balkans. Background Report No. 7: Inventory of planned hydropower plant projects. Final Draft 3. IPA 2011-WBIF-Infrastructure Project Facility-Technical Assistance 3. EuropeAid/131160/C/SER/MULTI/3C: 123 pp. https://www.wbif.eu/content/stream//Sites/website/library/WBEC-REG-ENE-01-BR-7-HPP-Inventory-05.12.pdf

WDA, 2017 – *October update of the WDPA. Protected Planet*. UNEP-WCMC. Retrieved 15 October 2017. https://www.protectedplanet.net/c/monthly-updates/2017/october-update-of-the-wdpa

WWF (Ed.), 2014 – *Rivers: lifelines of the Dinaric Arc. Conservation of the most valuable rivers of South-Eastern Europe*. WWF – World Wide Fund for Nature (Formerly World Wildlife Fund), Rome, Italy. 17 pp. (Among the list of Contributing authors and commentators). http://d2ouvy59p0dg6k.cloudfront.net/downloads/rivers_lifelines_of_the_dinaric_arc_1.pdf

WWF, 2017 – Hydropower development in Valbona Valley National Park, Albania. WWF Position Paper, March 2017: http://d2ouvy59p0dg6k.cloudfront.net/downloads/position_paper_hpp_in_valbona_national_park_2017_final_1.pdf