

# Latest status of hydropower plants in Turkey: Technical, environmental policy and environmental law from the perspective of the evaluation

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## Abstract

Hydropower plants (HPP) works only with water. Water; vaporized in the presence of sunlight back to earth as rain come again in favorable weather conditions. Here, the water formed in this way is transmitted to the user by depositing After precipitation and flow. This state is one of the most reliable and sustainable energy sources and hydroelectric power plants. But hydropower is also very tight to the fact that the area in which the water cycle as a renewable energy source that is very strictly linked to the global as well as climate change have in some minds. All disciplines interested in this direction with respect to these facilities (all engineering departments, politics and economics and administrative sciences etc.) by drawing lots. In this study, starting from the feasibility stage HEPP construction and operation stages as a whole and in detail. HPP construction of environmental regulations in this area are discussed taking into account the environmental ethics and environmental policy.

## Keywords

Hydroelectric power plant (HPP), Environmental policy and ethics, Turkey.



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## 1. Introduction

The increasing population of Turkey and water amount that is consumed by industry, agriculture and domestic areas is on the rise day by day (Jongerden, 2010; Bilen, 1997). Capitation water was determined to be approximately 1500 m<sup>3</sup> in Turkey. However that amount is in decline each passing day, and assumedly it may become 1200 m<sup>3</sup> in the next 10 years (Gökbulak & Özhan, 2006). In Turkey, it was emphasized that water is not a commercial commodity, it is unsalable and cannot be purchased, and it is an essential part of human life by Turkey Water Council in 2010. This is because water is frequently in the agenda (Turkey 2010 Progress Report, 2011). A structure, which has corporate integrity, that can control water completely and can conduct it cumulatively has not been established in Turkey as yet Fragmentary in nature in our country. This is because many contradictory situations can be seen in water management policies. The need of electric energy is increasing day by day due to the increasing population of Turkey, social changes, and different changes in industry. However, our country still remains behind in gradation in comparison with other countries in the world (Eroğlu 2007). There exist an energy gap as of today. In addition to Turkey's having various types of energy sources, the share of energy that comes from HPP constitutes the biggest (Kaygusuz & Sari, 2003). It is known that electric energy coming from HPP is the least amount among those various types of energy sources. As a result of factors such as rapid population growth, rapid improvement and industrialization in Turkey, the energy gap makes itself significantly apparent. The energy that is needed is provided in various ways. Only 59,2 % of the energy that is generated in Turkey is coming from Turkey's own resources since the year of 1999. Most part of the foreign-dependent energy generation is provided from petrol (8,9%) and natural gas (31,9%), and in spite of the developing export of Turkey, most part of the export revenue is spent on petrol purchase. Besides, foreign-dependent energy generation that affects external economic balance negatively is not at any price confidential.

That is why hydraulic potential, which is among the country's own resources for energy generation, takes place on the top because of reasons such as being renewable, requiring less operation and maintenance expenses, not creating environmental pollution or creating the least, and being the source which provides supply for reliable electric energy with its national quality (Environmental Impact Assessment Report on HPP, EIA) (TMMOB, 2004 and 2009).

Hydroelectric energy generation has many effects on natural, historical and cultural assets, and on socio-economic environment, and those effects change according to the HPP projects. The effects of projects with dams (collecting water) and regulators (temporary bloating and surrounding water) reveal itself in immovable properties that properties remain under water, resettlements of locals, damaging, declining or destroying forests, impacting rare and endangered species of fauna and flora. The financial, sociological and psychological aspects of this work are topics for other examinations. In addition to this, there needs to be further and detailed examinations in projects, not only site selection of HPP, all constructions should be together, but also the existence of other facilities and settlements on the same river, the present and future water need of the locals etc. Water should not be approached only from hydrologic perspective. If projects are approached from cumulative behavior in river basins, the possible future disputes regarding water can be prevented. In this way, taking projects, which are designed in detailed and with broad scanning, to the administrative courts can be prevented (Hoppe, 1924; Stummer, 2014; Abou-Raphael, 2006; Henry, 1939).

Hydroelectric as a term; is a nice reference to the generation of electric with water that flows from higher level to lower level in a waterway with the help of gravity force. "Hydroelectric power plants (HPP)" represents the whole structure, which contains all of the constructions (regulator, sand sedimentation basin, transmission constructions, surge chamber or basin, power conduit, HPP building), that

generate the electrical energy (Dursun & Gokcol, 2011; Balat, 2007).

HPP simply generate electric energy by flowing of water from a certain height level to lower level (the difference between levels is the gross head height), in other words, lowering water with power conduit into turbines that are in the HPP building and high speed of that water discharge turning the turbines. The generated energy is transmitted into national and international interconnected energy transmission line with an energy transmission line (ETL) after switchyard. These lines can usually be near HPP as well as tens of miles away from it. Therefore transmission with ETL is being passed through from different places (Dayson M. et al, URL 1).

In the projects, water that is taken from water intake structure is transported to HPP buildings with transmission constructions (tunnel, pipe, open channels etc.) with gravity. The length of those transmission constructions can be 15 km and more, and sometimes transport between valleys can be possible. In these kinds of situations, discharge (m<sup>3</sup>/sn) of the water, which is called ecological/sap/life water, is left to tributary from regulator between Regulator-HPP Building, is not enough for the fauna and flora around. This situation can be seen in cases that have been filed to the court by residents.

Besides, in a HPP exit, a regulator for another HPP in tail water is built and collects more water due to the fact that water-bloating levels are exceeding DSI's permitted levels, and that causes the change of gross head height which is important in energy saving (Dayson M. et al, URL 1). Besides, the changes in the places and levels of regulators open other unlooked-for water resources and gross head height to use.

## 2. General information about HPP

HPP's are built for the transducing of the potential energy of water into kinetic energy. Electric energy is generated through turning the turbines with flowing of collected water mass from higher level into lower. Hydraulic potential depends strongly on the precipitation regime. Those facilities

depend on the least operating cost and longest service life. Generation and amount of the water strictly depend on meteorological conditions of the region where HPP's are located. As a part of HPP project, water was transmitted from water intake structure (regulator) to HPP turbines through closed or open pipes, tunnels or channels, with free-flow tunnels as with gravity or pressure to surge chambers/pools or a valve chamber and afterwards with the help of power conduit. In a field of HPP Project, experts from Civil, Mechanical, Electronic Engineering, Geologist, Economist, Environmental Engineering, City and Regional Planning and Landscaping etc. are working in all operations. In the fields that require too much construction work; the guarantee of scraping the vegetable soil and storing it in favorable place and conditions is given by taking opinions of various institutions and organizations within EIA reports. In addition to these, there are stages of ground extracting, rock breaking, transporting and storing. Besides, there reveals roads, bridges, viaducts, studies of river reclamation, retaining structures of watercourse and roads, other protection constructions etc. that are needed to be constructed in the field. Materials (aggregate) such as sand and gravel are needed for concrete production so that all the stages can operate. Aggregates that are to be used in concrete production can be provided from dredgers from the field of projects but there is also need for other quarries. However, permission should be taken from industries and organizations as part of EIA reports for quarries, too. Therefore, there is a need for concrete production facility in the fields. This situation is originated also from the region that HPP's are located. These regions might happen to be far from other concrete production facilities, and condition and situation of the roads might be difficult. The production of those materials must be handled in the field. There is an obligation for establishing a crusher facility in the HPP field for this job. In this case, it is claimed that the material that comes from various aimed excavation activities (tunnel excavation, channel excavation etc.) can

be used. The residual over material is said to be stored in convenient place for a temporary time or permanently in HPP field and according to the science and technical rules. There are certain risks in those storage places such as landslide, washout, closeness to water areas, sediment that emerges from leakages and the negative effects of troubled waters on the watercourse.

Even though the service life of HPP's is stated as approximately 50 years, this life can be decreased or increased, depending on the watercourse and the changes in the river valley. However, the given term of the license is usually up to 49 (one HPP 49 years and 6 months) years. That kind of long term of license is not found appropriate in terms of not only climate but the structure and technical operation of those facilities. It was seen that some regulators expired in a short time and/or problems with wear-out failure due to the reasons like a few structural conditions' not being fulfilled and a mistake originating from watercourse management.

It is generally accepted worldwide that hydroelectric power plants are one of the energy generation methods, which gives the environment the least damage. The matter in the HPP operation is the water. Therefore, what comes in and goes out from the facility is also water. Of course some changes occur in the quality of the water. There seems no problem with its current state in the operation. Those energy-generation facilities are known to be the ones that are more eco-friendly in comparison with others. There are no types of pollution like wastewaters, solid waste, exhaust air, which means greenhouse gases (CO<sub>x</sub>, SO<sub>x</sub>, NO<sub>x</sub>, etc.), as a result of the generation.

Because of those reasons, this is another type of renewable energy along with the sun, wind and geothermic resources. However, HPP's are not that innocent in terms of the damage that is given to environment. Especially the construction process of HPP's can have huge environmental effects depending on the fields and regions they are in. Regulators, which are head works, behave like small dams and ruin the integrity of the watercourse. The oxygen levels and temperature of the accu-

lated water is affected negatively. By taking a big amount of money between the headworks and the fields that water is re-given to the watercourse, it changes the natural flow of the watercourse. It is certain to be more economic and more ecological by examining the effects of HPP building starting from headworks to the tail water on natural environment and people (social, psychological, financial and ecological), defining in detailed the facilities total established field and handling watercourse basin as a whole, emphasizing vulnerabilities and producing really good solutions (Both economic and ecologic), making the operation very good after construction, making the operation in harmony including operation stages in construction phase, making measurements and observations in the operation stages and editing where it is necessary etc. doing those particularities in a coordinated manner and controls being supplied. This should be the expected and the desired.

The most important effects of HPP projects in the construction phase; HPP is seen as a dust and noise that consists of traffic, heavy construction equipment and crushers by its closest fields and the fields around and in the roads. However, the huge amount of excavation that occurred in the construction can constitute a problem in terms of how to put it out of the way, how to transport it and where to store it. There can be impacts like vegetation in between is getting damaged due to pouring the excavation into stream bed and alteration of structure of stream bed, which arises in the process of water transportation that is executed with conduit, which is made in order to pass through valleys, regulator that especially in the dip slopes and channel/tunnel/piped system that has an open transmission structure with surge chamber/pool. In the impact of the operation stage, there can be seen a decrease in water discharge in the streambed which is between regulator and HPP structures because of using the water of stream bed that it was built on.

When we sort the impact of HPP's on environment; generally the head works (regulators) spoil the integri-

ty of the river and partially affect the stocks, microorganisms, fish way and the movement of migration in the river, water transportation lines that was constructed in a kind of open channel affect the other land animals' wandering freely, and affect some lands as making them to be awash. It causes a habitat division by effecting the migration of the land animals, when the soil surface (mainland, vegetable soil) is scraped in all construction areas there occurs huge destructions in the land, plants cannot grow, pollen generation is delayed and besides, whole soil surface is exposed to erosion, all aquatic life is endangered due to the change in the flow velocity and flow rate. Water is broken off from its bed and taken immediately into channels, piped systems and tunnels, and detracted from nature and people. This case comes into view as the biggest strike that effects the balance of the valley and the region. Besides, there is decrease in the agricultural production in parallel with the agricultural irrigation distress, and microclimate of the region changes accordingly with the water entrapment, also stock chain is interrupted for a long time in regulator.

It can be understood that HPP investors mostly make their determination of locations from the map or from the web page of DSI (State Hydraulic Works) and after seeing the location non-exhaustively they make their cost benefit analysis at short notice. It can be understood easier with tens of HPP existence according to the length and discharge of the water on a river. Water comes out of HPP's and before reaching its own bed again, it is immediately taken into another HPP regulator for storing. Since the ecological water/sap that is left from regulators is established and operated by HPP owners, their controls cannot be executed well. Event though DSI established a control team, there remains deficiencies. Sometimes rivers are dried up and the ground water is retreated. So there occurs too much erosion in the streambed. Those kinds of deteriorations cannot be recovered easily.

A river is not only water, not arriver to the sea after the transmissions like pipe, channel, tunnel etc. A river is an

important part of the ecological system and transmits the water and stock matters within itself to everywhere. If this condition collapses, since that would mean the collapse of basic life support of the fauna and flora in the system of that river, fauna and flora will collapse and be destroyed in time.

Privatization of the water and tubing of the rivers was realized in Turkey through the process listed : in 2011, a law is introduced for privatization of each type of energy generation facility, in 2002, HPP is made public as clean energy generation facility, in 2003, establishing financial possibility, which investments and incentives about energy are given, is started, the right of water usage is given to private sector, in 2006, Energy Market Regulatory Authority (EMRA) started to expropriate the immovable, in 2008, Environmental Impact Assessment (ÇED) is constituted and apart from this, expertise started to constitute, until 2023 water potential is expected to take with 100% help of HPP with planning HPP by 2009 State Planning Organization, in 2010 Turkey, dams can be constructed in all natural conservation areas and HPP can be constructed, the permission will be given to establish electric generation facility depending on renewable energy resources with the condition of taking the opinion in favor of necessary organization of protection area in National Park, Natural Park, Natural Monument and Natural Conservation Area, Protection Forests, Wildlife Development Area, Specially Protected Environment Area, Natural Protected Area; and those will lead Turkey's nature to be damaged, lost of flora and fauna, and conflict with the locals that live in nearby. The most objective parameters should be determined while giving the permissions in those sensitive areas.

In 2011, proposed law about conservation of nature and biodiversity were brought out. In addition to this, the encumbrances about investors (infrastructure, HPP and barrages) and development projects were tried to be abolished (infrastructure project, HPP's and barrages). In addition to this, it was assured that it was licensed from somewhere central. Some people

from rural area start to talk about this issue. Many legal modifications continue about this issue.

On some rivers, there are operations with varied purposes and those operations still continue. Rivers were employed with many usages. On some rivers, water bottling factories were allowed, and the number and capacity of those were improved. Huge fertile (agricultural land and forested land) lands were submerged due to the reason that finished and planned dams for some rivers covered extensive area. Organic substances that accumulated in those dams turns into coal gas in time and since there emerge huge water surface area, vaporization and loss of water started to emerge in those regions.

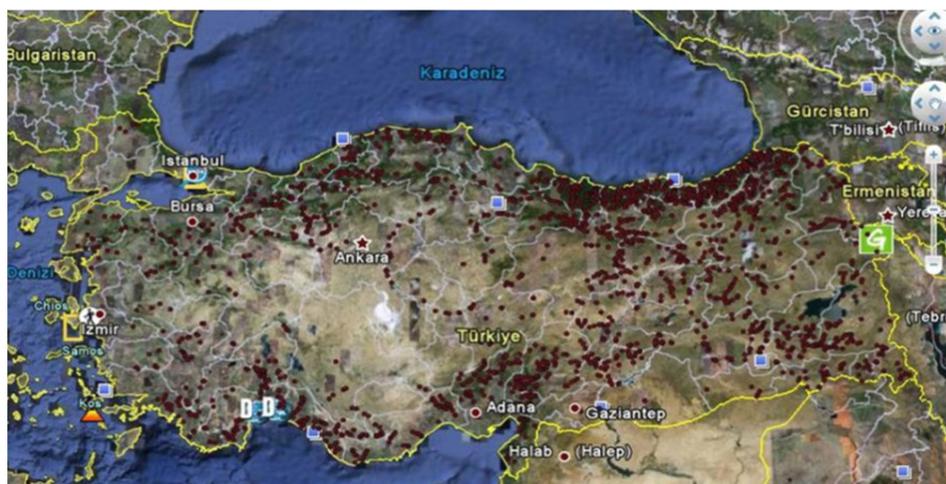
It is possible to cutting the trees which has a risk to submerge in the reservoir lake or submerge as a result of the rise of the water depending on the size of the project in HPP region, and this situation causes decrease in the quality of forests. There are changes in other habitat as a result of this decrease in the quality of forest. In addition to all of this, there emerge changes in the regime of ground water in that region. Increase in the ground water start changes in aquifers (ground water carriers) hydrogeological and that condition affect fauna and flora on the surface.

It is stated that HPP's low emission of CO<sub>2</sub> is an important tool in the struggle with the climate change by governments and scientific experts of energy sector.

However, its place would be discussed when considering all the negative environmental effect in the systems it creates, and considering "ecological foot print, therefore carbon footprint". Ecological footprint is a unit of measurement that reveals the reproduction of the natural resources that we consume and at the same time, how much land and water area we need to recycle the released waste. In a way, it describes the burden that is on the sustainability of ecosystem of consumption of the energy resources of humans in order to live on this earth. Carbon footprint, on the other hand, is the measurement of harm that human facilities give to environment in terms of produced

greenhouse gas that is measured in class of unit carbon dioxide. Carbon footprint consists of two main parts; direct/first footprint and indirect/secondary footprint. First footprint is the measurement of direct carbon dioxide emission that generated from burning fossil fuels. Secondary footprint is the measurement of indirect carbon dioxide emission that is related with whole lifecycle of the products that are produced and consumed, manufacturing and at last, spoilage. Along with the cost of transmission line, it is necessary to consider the following as the secondary footprints; forest destruction where it passes through, high rate of electric leakage during the transmission and nature destruction to the area that those lines connect with the national grid. When we approach to the product as energy, HPP aims at producing a product and launching it to the market. Even though the product has no negative effect on the carbon dioxide emission after being produced, a reference can be made to the process of the production of the product, which means generation of the energy, (building the facility and operating it) there are carbon dioxide emissions to the nature. Therefore, it can be concluded that HPP makes its contribution as a carbon dioxide emission to the nature in terms of secondary footprints. Apart from all of these, if a tertiary footprint definition would be done as developing a new concept; product that reaches the consumer as a result of generated energy has pioneering role in initiating carbon dioxide emission (like energy use in the sectors of transportation, agriculture, industry, tourism etc.). When we compare carbon footprint and ecological footprint that was created by HPP, fundamentally, it would be revealed that ecological footprint can be at much higher rates.

In terms of the socio-economic effects of HPP, it has certain contribution to internal economy such as; intensive employment, enrichment of the commercial life, recovery in agricultural activity, developments in forestry and tourism. However, during the construction according to the quantity of electrical power, approximately 50-60 people, during the operation 8-10 peo-



**Figure 1.** Map of Turkey hydroelectric power plant.

ple on average will be employed in the facility that will be built. Personnel that will work in operation stage are generally coming from out of the field of HPP since they mostly have technical and qualified specialities. In addition to this, more indirect effects like flood and landslide, carbon cycle, to natural life and ecosystem cycles, even though their measurements are hard to calculate quantitatively, it is estimated that serious distresses will emerge in the future regarding providing the benefit that is claimed by HPP firms.

### 2.1. Condition of HPP's in Turkey

It is known that HPPs are preferred among various energy resources due to their being nature friendly and having low potential of risk. These kinds of power plants can respond immediately to the sudden changes in demands. That is why they are called peak power plant (satisfies the sudden demand) in Turkey. DSI General Management defines HPP as having the following benefits: "environment-friendly, clean, renewable, able to satisfy sudden demands, highly productive (over 90%), no fuel expense, has insurance role on energy prices, long-lasting (200 years), investment's payback period is very soon (5-10 years), low running cost (approximately 0,2 cent/kWh), domestic resource not foreign-dependent (DSI-Hydroelectric Energy Report, 2010)".

In Turkey, 172 HPP's are in operation. Those HPP's has 13.700 MW installed power and 48.000 GWh annual average production capacity which

corresponds to 35% of the economic potential. 148 HPPs are still in process of construction, which have 20.000 GWh annual production capacity that corresponds to 14% of total potential and has 8.600 MW installed power. To use the remaining 72.540 GWh/year potential, 1.418 HPPs will be built and the number of hydroelectric power plants with additional 22.700 installed power will increase to 1.738. It is possible to use all the economic hydroelectric energy potential in the rivers of the country with the future HPP's that are 1.738 HPPs and corresponds to Turkey's total power of economic commission which is 45.000 MW (DSI, Hydroelectric Energy Report, 2010).

It is seen in Figure 1, the Map of Hydroelectric Power Plants in Turkey that HPP's usually and mostly are in Middle and Eastern Black Sea Area and South-Southern East side of Anatolia. Main reasons of this is the climate (rapid flow, continuous rainfall etc.) and geographic (deep valleys etc.) conditions that are most suitable to economic yield for HPP projects are those areas.

### 3. Legal process for HPP operation and matters not provided for

According to Turkey's priorities, the institute that in responsible of planning all water resources, managing, developing and operating is DSI. The Ministry of Foreign Affairs coordinates the making and following of the national and international water policy of Turkey. The license of HPP and Regulators that finalized its projects, Water

Use Right Agreement, making final design, facility, allocation, construction plan and construction license are in the framework of following rules and regulations.

- “Regulations about Procedures and Principles Regarding Entering into Water Use Right Agreement in order to Do Productive Activity in Electricity Market” that went into operation in Official Gazette in 26.06.2003,
- 17. article in the Forest Law No. 6831,
- “Regulation about Allocation of Forest Land” that went into operation by being published in Official Gazette in 22.03.2007,
- EIA Regulations that went into operation by being published in Official Gazette in 16.12.2003,
- Soil Conservation and Land Use Law No. 5403,
- Pasture Law No. 4342,
- Provincial Special Administration Law No. 5302,
- Construction Law No. 3194

According to the Electricity Market Law No. 4638, all construction of the electric generation facilities are given to the private sector. The electric generation license and essences of Water Use Right Agreement in order to design HPP project were determined in “Regulations about Procedures and Principles Regarding Entering into Water Use Right Agreement in order to Do Productive Activity in Electricity Market”. The purpose of this Regulation is to determine procedures and principles in the framework of the provisions of Electricity Market Law No. 4628, signing process of “Water Use Right Agreement” for auto producer and auto producer group license in between DSI and juristic persons, and in establishing energy generation facilities, production related with operation for juristic persons that are still in business in the market or will be. The statement of Combined Facility, which is in definitions part of Regulations, is actually very important for our topic. Because it states that as a HPP, usage of the water, which was transferred into capital in long time intervals, is not only for energy generation but also “facility that aims many purposes such as providing irrigation, potable and tap water, and also it is surge protector along with energy generation” as it is stated in the definitions section. So it is clearly stated that water whose impor-

tance as a commodity is increasing day by day is not only being used to generate energy but also for storage and other purposes. The purpose of the Electricity Market Law is to; create electric energy market that can operate according to the private law rules, financially powerful, stable and transparent in order to provide electricity which is sufficient, of good quality, continuous, budget-friendly and environment-friendly to consumers, and which provides an independent regulation and supervision in the market. Law aims at mobilizing the existing but unused potential in the market by pointing out the necessary mechanism for “creation of an electric energy market”. Mobilizing the potential may be the clearest but the most technical statement. Any kind of neutral/technical language that points at releasing the potential, which means the things that are non used but supposed to be used, is unfavorable.

The firms that gained right to sign the Water Use Right Agreement and Electricity Generation Right start preparing their EIA reports later. According to EIA Regulations, the previous installed power is 50 MW and more river type power plants (RTPP) are in the Appendix-I list of EIA regulations, the ones whose installed power is 10 MW and more RTPP are counted in Appendix-II list while the HPP projects whose installed power is 10 MW and less are exempted from EIA process. With new EIA Regulations that were published in Official Gazette No: 26939 in July 17, 2008, HPP projects in between 0,5-25 MW came under the Appendix-II. Appendix-II projects are tributary to preliminary EIA, it does not require the processed of public participation and information. However, the projects that were accepted before that date are tributary to the old regulations and exempted from EIA process. While it is necessary to complete the EIA process first according to the 6th. article in EIA regulation, the condition of EIA process is being started after signing the Water Use Right Agreement and taking the license of electric generation from EPDK is a contradiction. While starting EIA process after signing Water Use Right Agreement and determining the investors and giving the allowance

of electric generation according to the result of the process is a much more accurate method, Ministry of Environment and Urbanization leaves the EIA evaluation to the end of the process, when investor made various expenses and that turns the EIA process to a kind of approval of the EPDK process. It is a serious and important absence not to include the electric transmission lines (ETL), which are used to transport the generated energy and is an inseparable part of HPP projects, to EIA reports about HPP projects. Along with the cost of transmission lines, where it will pass through and the forest destruction it will create in the areas it will pass are also not included in the projects. In fact, the nature destruction those lines create until the part where they will connect to the national grid is in very high level. High-tension lines mostly passes through above the settlements, ravines so it may have negative effects on human health. Since it is possible that EIA would not allow the electric transmission line after the construction of the power plant ends, and it is possible to spoil all investments; having EIA to electric transmission lines afterwards is becoming a factor that can affect public will. In this case, EIA report that is taken for transmission lines after completing the construction of HPP is not credible and should be evaluated considering electric transmission lines are thought to be the same project with HPP. However, the situation is the opposite.

Besides, the process about HPP's in Turkey is for profit and it is shaped according to the market so many missing things or mistakes were encountered in the process of preparing EIA reports. Especially the Environmental Consulting firms, which are assigned to prepare EIA reports and complete the relating procedure, prepare reports negligently, with copy-paste method and mostly without examining not even project field with the encouragement of ministries. Ministry of Environment and Organization, which has authority to inspect the related processes and report, and make decisions, encourages projects to be accomplished rather than preventing the effects project cause to environment, Therefore, Public Par-

ticipation Meetings that are practiced in the project field and Examination-Evaluation Commission (EEC) Meetings that are performed in related units of ministries are only shows.

The inspections about HPP's should continue during construction and after operation Inspection should be executed in relation to whether protecting public resources is achieved or not and whether science and engineering requirements are met or not.

The false evaluations causing natural destruction which is hard to recover such as leading water to operate as one-sided, leaving fisheries near the river in a difficult position and making local people confronted with migration should be corrected. Adjudications should be ensured to be performed, and despite the local people, one should scrutinize in the stage of allowance for the profit-oriented HPP construction.

Any HPP that is going to be built should not have a judgment or allowance like "No Need for EIA" since there are HPP's that were built and were engaged in a lawsuit afterwards. All legislative regulations and legislations that provide an infrastructure to this condition should be changed.

#### **4. HPP's evaluations in terms of environmental policies with regards to political tools and principles**

##### **4.1. Conflicts with national regulations**

In the Constitution of the Turkish Republic No. 2709, in article 17, it is stated that everyone has right to live, protect and develop its own material and nonmaterial existence, in article 56, everyone has right to live in a healthy and balanced environment, it is State's and citizens duty to protect the environmental health and prevent pollution. Besides; according to the Environmental Law No. 2872, in article 1, it is stated that the aim of the Law is protecting the environment, which is all citizens common asset, healing it; land and natural resources in urban and rural areas should be used and protected most appropriately; preventing the pollution of water, earth and air; the actions to be taken and regulations to be held should conform with

the economic and social progress goals and should be organized according to certain legal and technical elements in order to ensure today's and next generation's health, civilization and standard of living to be developed and guaranteed by protecting flora and fauna, and natural and historical wealth. Ministry of Forestry and Water Affairs is assigned to find water resources, design integral basin plans to use them according to the Law of Establishment of Ministry of Forestry and Water Affairs, article 9, item 'c'. There is no such plan for any basin in Turkey. It contradicts with Ministry's law of establishment that before designing any plan for basin and finalizing the issue that conditions of utilization of resources would be for superior public interest (after detecting what the region has as resource value), just considering HPP projects which are designed only for generation of electricity. Ministry of Environment and Forestry, which was closed and sheared off as 'Ministry of Forestry and Water Affairs' and 'Ministry of Environment and Urbanization' after general elections in June 12, 2011, has an Environment Condition Report that was published in 2007, and in there it was determined that main goal of Turkish Environment Policy is protection and development of the environment with sustainable development (Evaluation of Environmental Issues and Priorities of Turkey Reports, Ministry of Environment and Forestry, 2014). In the same report, the main strategy of environment policies is determined as management of natural resources, providing sustainable development with the condition of protecting human health and natural balance and transferring next generations natural, physical and social environment. However, designed HPP projects are in a level that can spoil the natural balance in the project field and may affect the environment sustainability integrally.

For us to have an idea about how HPP's are managed in terms of energy policies, we need to examine "Law of Organizations and Functions of General Directorate of State Hydraulic Works" and Law of Organizations and Functions of Ministry of Energy and

Natural Resources". In the DSI Law of Establishment, article 2, item 'f', the job definition is "Make reforms in the river and make the possible ones navigable" plays the biggest part for HPP's to be implemented. In Law of Establishment of Ministry of Energy and Natural Resources, article 2, item 'e', the job definition is "Determine the production, transmission, distribution and consumption pricing policy and when it is necessary, determine the prices of the products that are produced with underground and overland natural resources" and this definition legitimizes the legal process of HPP's. The energy policies in Turkey were established on managing mostly the supplies rather than demands. This approach causes the energy investments focus on generating as much energy as possible and causes the practices like "productive usage of energy" to remain in the background. For example, losses and leakage of electricity while transmitting is up to 20% and this makes our energy usage impoverished. Besides, General Directorate of Electrical Power Resources Survey and Development Administration (EIEI) states that by only making the necessary saving precautions, there can be a saving of 3 billion USA dollars value energy per year. Besides all of this, another problem related with HPP's is that ignoring participation principle in projects while preparing EIA reports. Passivize the local people who will be affected by the project is another common incidence. Local people is not even asked for an opinion for the projects that are under 25 MW. In the projects over 25 MW, Public Participation Meetings are organized while EIA process continues, however, these are mostly the company officials of project informing people about the project rather than meetings. In that case, both the meetings and EIA Report preparing process remain weak. While examining HPP process in terms of Turkey's Environment Policy, it would be beneficial to examine National Environmental Strategies and Action Plan, 9<sup>th</sup> Progress Plan, Government Program Action Plan and Manifesto of the parties that are governing and their opinions about energy issue (URL 3).

In National Environmental Strategy and Action Plan (SPO, May, 1998), it can be seen that in the light of approaching HPP's, it is in phase with Progress Plan and Government Action Program when examining "encouragement of using resources in a sustainable way" and "supporting the sustainable practices that are related with environment", "integrating strategic goals and economic rationality in productivity".

In addition to these, it was on the agenda to include "management of integral water resources", policy making about protecting and managing the water basins, aquifers (carrier of groundwater) and wetland. Even though it was recommended that preparing "Regulations about Management of Water Basins" Law's brought into force, evaluating wetlands, mountains, summer ranges and coasts as parts of the environmental protection policies as they are ecosystems on their own by considering the ecological, economic, social and cultural conditions in water basins (National Environmental Strategy and Action Plan, SPO, 1998, Appendix-6, p.6), how those rules and regulations contents' will be organized is not mentioned. While detecting eco-basins in accordance with sustainable resource usage goals are put on the agenda; "decreasing sedimentation can extend the economical life of barrages and hydraulic power plants (National Environmental Strategy, Through UÇEP, SPO, 1998, p.62)" statement is conflicting. According to that statement, it can be said that goal of using sustainable resource within Action Plan gest ahead of the goal of protection of the environment.

While expecting more articles and goals about protection of the environment in an environmental strategy, we confront with impression that goals like "Encouraging Clean Technology and Energy Resources", "Harmonize the Environmental Protection and Policies about Production and Consumption of Energy (National Environmental Strategy, Through UÇEP, SPO, 1998, p.61)" are prioritized.

In the 9<sup>th</sup> Progress Plan that was prepared for the years 2007-2013, there is no article about protection of the water. When we look at the statements

about HPP's, "The projects that are included in public investment program, especially the HPP projects should be completed with minimum cost and quickly to be brought in the economy. That is why, it will be attentive to reflect the truth in investment costs, not practicing cross-sectoral cross financing and prevent the cost increase that can be originated from the delays in the projects, we can say that it was emphasized that HPP's should be productive in terms of economy. In the 60<sup>th</sup> Government Program Action Plan, under the title of "Increasing Competitive Power", given with "benefiting from renewable energy resources at their maximum level" and "supply security of electricity will be increased" facilities under the title of "Developing Life Quality"; under the light of the facility "The studies about using water resources in a more sufficient way will continue", there is a coherence with 9<sup>th</sup> Progress Plan. The things that are intended for protection of the water is "afforestation, struggle with erosion and continuing the recovery studies, more livable cities will be created by developing green belt cities." in this facility (URL, 4; URL, 5; URL, 6).

Even though it is directly emphasized, protection of the water can be provided indirectly with creation of forests (60<sup>th</sup> Government Program Action Plan, 2008, p. 25-27-32-34). Lastly, present management in the titles of "Energy and Environment" in the evaluations of HPP's, it is said that "About the hydrogen energy, which is the energy of future, serious scientific and technical projects will be started, and necessary studies will be performed in order to cutover with other developed countries". It is crystal clear that new hydroelectric power plants and stream power plants that will not make any harm to environment, have high sufficiency, equipped with new technology and based upon local coal will be encouraged to be built by private sector along with the energy types such as solar, wind, geothermal and biomass. There are few attempts to built stream power plants mainly in some certain places in Turkey.

In addition to other energy resources, HPP's were adopted very well. On

the other hand, all the damage in the end of that process will harm the local natural condition and the living things around will be harmed. River basins and fields that were built upon the HPP's are usually turned into private properties. After transferring "right to use" with the privilege coming from EIA reports, changes start to occur in the region. There are disputes between local people and operators and also the ones that defend all the lives in the river. The producer companies have much more investment from public on the occasion of HPP planning. In this case, the public is at loss. The arising losses are supplied by state and this case returns state back as public loss.

#### **4.2. Discussion of the HPP's in Turkey with regards to jurisdictional decisions**

There are many HPP plans made in Eastern Black Sea region and about the ones that are completed, close to completed, not started yet; there are finalized, adjudicated or still continuous cases in administrative courts. It is very hard to say that there will be no cases for HPP's any more. Because the prepared EIA reports are far from reflecting reality and whatever the reason it might be (for example local people may change their minds and decided to make agriculture, more water demand due to the change in the agricultural products, water amount that will be left from regulator in the river for fauna and flora around because of dry seasons etc.), if the given promises are broken, then cases will be opened in courts.

In some EIA reports, economy is highlighted and natural resources are desired to be used by showing the situation that it is the concern and benefit of the whole society and using in legal parlance "best public interest, public health, national security" so that it can be an answer to rising demand of people and supplying the energy gap of Turkey. However, this situation does not entirely reflect the truth. It is a totally different topic that energy production is transmitted to industry areas that are really far away rather than using in the region where it is generated. All in all, ecology on which everyone has a share

is sacrificed for the sake of economy. All these thoughts should be reflected upon the term ecology (environment, biological diversity to survive, sustainability of life cycle). If there is a common interest of the society, only public interest should be considered. However, economical cycle can be provided in this ecological cycle. There can be seen negative conditions in antecedent precipitation index in the places whose ecology is spoiled and meteorological conditions are not as in the past. The speed of river flows have decreased causing the dams beneficial volume and reservoir originating from regulator to be fulfilled in a short time. Briefly, what is aimed at ecological reports is to protect biological diversity (fauna and flora). That is public interest.

HPP projects are designed for all parts of our country and projects are being constructed. In this topic, there are projects that are performed with both DSI General Directorate Head of Department of HPP and Dams and DSI Regional Directorates, and EPDK is also a side of this topic.

In Turkey in the HPP context, the most discussed topic about this term and other policy principles are the Court Decisions about related HPP's and among those, the ones that are approved in Chancery and returnees. When those decisions are examined, it can be seen that the decisions were from various sides, it can also be understood that environmental policy principles are not practiced in terms of Project Description File (PDF) and topics from the projects that EIA reports come out as Positive and most importantly in terms of environmental policies.

It would be beneficial to examine a different examples before passing to the examples of those cases. In the case of Muğla 1. Administrative Court in March 30,2010, Docket No. 2010/342; the project of "Yuvarlakçay Regulator and HPP" that has 3,40 MW and was planned to be built up in Yuvarlakçay that is located in Muğla Province, Köyceğiz District was decided to be cancelled since its power is under 10 MW and based on related EIA Regulations so that project can be excluded from EIA with the operation numbered 262

in January 01, 2008. The main reason for this decision to be made is that even though the operation is under the defined values (10 MW), the matter in dispute will create irreversible destructions to the environment. The most important principle in this case is 'precautionary principle'. Even though it was foreknown scientifically, and help of other methods, that power plants that will be built up with related value (10 MW) will not relatively harm environment, the decision taken will prevent the possible problems.

These kinds of cases were opened also in Trabzon, Rize, Artvin, Giresun and Ordu in Black Sea Region and it was seen in many courts that rather than PDF, a more detailed EIA report was required. However, it was also seen that in the Ministry defenses in judgment books, there are kind of statements like 'if that was in the regulations, then everything is okay'.

In other examples; in the case in June 30, 2010 Docket No. 2008/769 and Decree No. 2010/313; Cüneyt IA, IB, IIA, IIB, III, IV HPP Projects that were planned to be built in Artvin Province, Şavşat District Meydancık Town, has been decided to be cancelled since it is conflicting with core and aim of EIA Regulations and there at no best public interest in such kind of project by Rize Administrative Court. Again in a case Docket No. 2008/536 and Decree No. 2010/312 about the cancellation of EIA Affirmative Decision in June 30, 2010 by Rize Administrative Court about HPP Project "Dereköy Regulator and Dereköy HPP" that were planned to be built in İkizdere District of Rize Province; EIA Affirmative Decision were decided to be cancelled on account of the facts that EIA process were operated wrong, acted contrary to legislations, approved the HPP studies without making integral basin planning, did not take necessary precautions to protect flora and fauna, did not detect or examine about continuity of water ecosystems and aquatic living beings, has insufficient precautions while conducting the project and in that way, EIA Affirmative Decision was contradicting with both regulations and responsibilities that were accepted with international conventions.

In another case, Docket No. 2008/369 in Rize Administrative Court in December 11, 2009 was related with the cancellation of EIA Affirmative Decision; EIA Affirmative Decision about "Paşalar Regulator, HPP and Borrow Pits" that was planned to be built in Rize Province Fındıklı District was required to be cancelled because it was clearly contradicting with the law in terms of authority, feature, reason and topic, and best public interest is all about protecting the valley and transferring it to the next generations. In the related project, EIA Affirmative Decision was decided to be cancelled based on that related decision was ignoring the 1st, 9th, and 10th articles of the Environment Law and principles of environment and sustainable development, and also not practicing participation principle, related project was not made based on the basins, not coherent with the existing Environmental Plan and City Development Plans, and the projected values for aquatic life and aquatic ecosystem were inefficient.

When we put all the pieces together; we can see that jurisdictional decisions regard precautionary principle, responsibility for next generations, providing other living beings right to live by protecting biological diversity, prioritize the protection of the nature rather than economic interest, best public interest etc.

#### **4.3. Evaluating international regulations in terms of HPP's in Turkey**

Specific to HPP's, equivalent of Turkey's water policy in international field can be approached from negotiation process with European Union (EU). In the pre-accession process of Turkey to EU, Turkey should practice and adopt Union's regulations at any cost. One of those regulations is Water Frame Directive (WFD-2000/60/EC) which is characterized as a general umbrella regulation in water management. WFD requires all water bodies to be in condition that as natural and unspoiled as possible in terms of quality and amount by making basin management plans in river basins scales. Water Frame Directive requires the existing aquatic ecosystems to be in a

good condition in terms of quality and amount by making management plans on the basis of basins. WFD allows new hydraulic constructions under certain conditions (Article 32), however, this allowance is provided under certain strict conditions; all measures should be taken to prevent negative effects, these necessities should be for public interest (for example; control of overflow and landslide), new developments should not block reaching existing EU environmental standards that aimed at protecting environment. For reflecting strategic environmental evaluation on national regulations, the studies that are conducted by Ministry of Environment and Urbanization were started with the undertaking the developments that will be followed and the necessary studies will be done for EU National Cohesion Program under the EIA title in terms of strategic environmental evaluation. "Template of WFD Regulations Preparation and Application for Turkey Project" contains a template of WFD regulations prepared based on EU WFD Regulations after those undertakings. Even though this study made important contribution by revealing certain aspects, it could not ensure creating a desired legal ground. In the process of HPP projects, it is possible to have a situation that is contrary to law since various wild living beings' (otter, wolf, coyote, bear, rupicapra rupicapra ornate etc.) lives are under the protection of many international contracts like Ramsar Contract (the Convention of Wetlands of International Importance), Bern Contract (Contract For Protecting Wild Life and Habitat of Europe) and CITES Contract (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and if the living space of those animals can be disturbed due to the HPP constructions and this resulted in mentioned species to leave the space or decrease in their species. Opening roads, dynamite explosions, noise due to the construction equipment night and day may lead those species to leave their living space and feeding ground. Even though in related EIA reports, this situation attracted attention from time to time and various measures of conservations were recommended,

investors do not take any notice on those since those recommendations require additional costs. Operations of environmental monitoring of HPP projects are conducted under the supervision of Ministry of Environment and Urbanization. Ministry provides the option to any active company that has license of efficiency to work with any Environmental Consulting Firm. This situation leads to false monitoring reports that are not objective since company officials generally agree with Environmental Consulting Firms that prepare the EIA reports for the related projects. On the other hand, DSI officials of Provincial Directorate of Environment and Urbanization who have the authority to inspect the practices the area of activity make their inspections either insufficient by claiming not having enough number of personnel or make those arbitrary and for show when there is pressure of civil society. There are also difficulties in sharing authorities between institutions.

It is also beneficial to examine Natura 2000 Regulation that can be counted in international regulations since it was prepared by EU in order to control environmental effects of HPP's. Natura 2000 is a natural environment protection network that was determined in the borders of European Union. Each country that is a member of European Union has to compile the most important natural habitats in its own territories and species of flora and fauna that lives in there. Afterwards, this list should be delivered to European Commission. If a space is observed that should be in protection among those lists that was evaluated by relevant authorities, than those spaces are taken into Natura 2000's protection network. Various adaptation studies were started in order to be included to Natura 2000 network, however, there is no regulations or formal studies yet apart from the related adaptation projects, meetings and conferences.

Convention of Biological Diversity has another importance, which provides guarantee of principles that other living beings right to live and sustainability of lives, in HPP studies. In this convention, it was recommended to have "ecosystem approach" in the

projects like HPP. Ecosystem approach is based on practicing the proper scientific methods by focusing levels of biological organizations and including important structure, processes, operations and interactions between organisms and their environments. It is accepted humans as interiorly component of many ecosystems with their cultural diversity. Ecosystem approach provides an integral environment in practicing the goals of the Convention of Biological Diversity. Approach includes 3 important evaluations. The first one defines the management of living components as not focusing on the species and management of habitats but considering organization with economic and social evaluations in ecosystem level. The second article advises if fair management of the earth, water and living resources should be sustainable, than it is necessary to study with natural limits and natural operation of ecosystems needs to be used.

Third and lastly, it should be understood that ecosystem management is a social process. There are many communities to be included so that effective and sufficient structures and processes can be developed for decision-making and management. The article "Equal and fair share of the benefits that comes from genetic resources" in the convention is being ignored due to the practices that is brought by "Shared Facilities" term which was in the regulation "Water Usage Right Agreement". At the same time, while the related convention refers performing integral basin planning in construction of HPP's, Turkey has not actualized a serious study about that issue. As a different example, we can examine United Nation's Convention for Combating Desertification, which focuses recovery of land productivity, recovery, protection and sustainable management of land and water resources and enhancing living conditions of especially local communities in combating desertification and drought. Turkey, which became a side of the convention in 1998 with Law No. 4340 that was published in Official Gazette No. 23258 in February 11,1998; in the strategies it developed regarding the convention, the part about recovery and protec-

tion of the water resources was omitted in the convention, therefore, it can be defended that convention has no motive for enforcement in Turkey in terms of HPP's. While examining the international regulations, we can reach expectations about HPP process from "Agenda 21 Action Plan" which is the ultimate statement of global negotiation and political commitment in making actualizing the term "sustainable development" that targets balance within whole world's countries and environment. In the road that opens to the future century, starting point of the Agenda 21 themed "sustainable development" is United Nation's Environment and Development Conference which was called "Earth Summit" that was performed in Rio de Janeiro in June, 1992. We can look at the section "Providing Fresh Water Bodies and Protecting Quality: Practicing Integral Approaches in Development, Management and Usage of the Water Resources (Section 18)" in "Protection and Management of Resources for Development (Part II)" in the Agenda 21. There is emphasizes in there to both integral basin plannings and principle of protecting-using the resources. Apart from those information, when we examine EU Integral Environmental Harmony Strategy (UÇEŞ 2007-2023, ÇOB-2006) by Ministry of Environment and Forestry and, in return, EU 2010 Progress Report, we can have an external point of view about our policies on HPP's. In the EU Integral Environment Harmony Strategy, principles like cross-sectoral integration, pay as you pollute, sustainable development and protection of the natural resources attract the attention. Among the strategies that was defined in WFD context, the statement "It will be ensured that natural water resources and water ecosystem's usage will be sustainable (4. Aim)" is aimed. However, ministry's goal under this purpose digress and tend to go to very different way; "Action plan will be prepared until 2010 in order to prevent the pollution caused by drainage water due to the irrigation". Apart from these, there is no evaluation related with HPP or Hydraulic Energy under the title of Water Market inside UÇES. In response to the UÇES

and the developments in Turkey, the EU 2010 Progress Report that was prepared by EU, there are comments such as to summarize all discussed process related with HPP's until now. First of all, it was stated that investments on renewable energy came to a good point and bring investors from private sector into the field. Secondly, the problems about inefficacy of institutional framework about water management, the distress of not being organized in the level of river basin and not being able to practice the management plans. Lastly, it was reported that there are concerns about construction of the new water and energy infrastructure in the eastern side of the country like potentially negative effects on protected species of flora and fauna and possibility to remove existing protection level of many areas that could contribute Turkish Natura 2000 network which was sent to TBMM (Grand National Assembly of Turkey). Briefly, when the report is examined generally, it can be concluded to "A well progress was achieved in the renewable energy. A limited progress was done in the quality of water. There is no progress in the protection of nature (URL 7; 8; 9; 19; 11).

## 5. Conclusion

It is a fact that Turkey as a developing country has an increasing energy demand and foreign-energy dependency in these days. In recent years, there is a huge tendency towards hydroelectric energy so that increasing energy demand can be met and foreign-energy dependency would be decreased. Benefiting from hydraulic energy at its utmost efficiency will decrease the foreign-dependency in energy, and also it is important for clean energy resources to be activated. However, with "Electricity Market Law No. 4628" and referring to that law, "License Regulations of Electricity Market" and "Regulations about Procedures and Principles Regarding Entering into Water Use Right Agreement", HPP practices reached to very different dimensions. This process ended up with many legal entities, which is not an expert of this job, like food firms, medical firms, or even sport clubs, tried to establish HPP.

The most convenient scale for protection, which different sectors and source users are thought to be together, threatens and possibilities are evaluated in long-term, watching the positive and negative effects of the intervention somewhere inside the basin, would be organization of basin based upon hydraulic limitations. First of all, in the fields that HPP projects are planned in, integrated basin plans should be designed and various values and usage components in basins should be determined. It is definite that total environmental effects of the projects is at a scale that will spoil integrity of the ecosystem considering the number of projects to be built, the power of the project and topographic conditions of those projects. That is why, there needs to be an integrated EIA that involves each project on the basis of basin, and integrated water usage regulation plans based upon basins. It is inevitable for HPP's that were put into operation without making integrated basin planning to cause irreversible environmental disasters like landslides caused by HPP's in the Eastern Black Sea. Besides, water detection studies of the rivers where HPP projects will be constructed should contain long-term observations and should include public seasonal water consumption amount. Those rates should be compared with the sap amount that was planned to left in project files, and sufficiency should be questioned by including the ecosystem needs. EPDK and DSI General Management should definitely inform the related local institutions and organizations before giving the necessary allowances and should request an opinion from related institutions. Each project in the process of license and EIA should be evaluated in its own effect. There should be an integrated evaluation. Allowance and EIA processes should be performed much more captiously. In those stages, the opinions of the institutions and organizations should not be undertaking but the project should be seriously examined and possibilities should be written accordingly. The responsibility should not be left only to the producer firm in most of the possibilities. After completing projects, a presentation should

be made not only to local people but only to science committee in the city center that project will be constructed and a voting should be performed in an atmosphere of question and answer. The people that have limited participation to the rural EIA meetings listen to the presenter and cannot ask any question. Because they are not familiar with the topic and there are also some other cultural issues. For example, they could be intimidated by the power exerted by companies. At least 70% of the people should participate. Public Participation should be postponed in the lower situations than that rate. When the participation reports are examined, it can be understood that participators are mostly from firm, project team, MEU city delegates. Without accepting submittal EIA project by performing two-stage Public Participation Meeting, there should be no construction work in the field by no means.

In the stage of license giving for project and right after starting to the construction, every step should be controlled (video, photograph, document etc.) with great details. There should be established a special inspection team, which is expert in its topic and can be independent/sworn, that opens the room for inspectors to be taken to independent jurisdiction.

The environment law that is defined in constitution can be a beginning of reaching an integral line of environment policy by developing right to live as a purpose with interpretation. However, while this right is being used by society, an administrative organization that will practice the court decisions in order not to damage society's feelings about security of the legal order is a must. Besides, the environment policy's, which was developed in the decisiveness of international firms, tendency that approach environment as a tool for one-day and development should be abandoned. Public good and sustainability of the environment should be in the foreground in chosen policies, and first target should be applicability in the decision of economic vehicles and justice.

To conclude, water, first of all, is a matter ethically that has its own intrinsic value (along with the ability

to sustentation, physical and chemical features), in addition to his, it is a source that indispensable for all lives and ecosystems and all society benefits from. For that reason, all attempts aimed at usage of the water should be performed in the framework of public good. Mechanisms that will provide people's access to the environmental information and being involved in the decision-making process should be established. Not supply but demand should be managed in the plans for using water economical and for handing water down the next generations with quality and sufficient amount. Turkey's water and environment policy should contain the principle that water does not go to waste; all kind of precaution should be taken to prevent interruption of natural water cycle due to any investment.

Many firms, which formed water usage contract with DSI, take national or international partners, or revolve HPP's to totally international firms. This situation may leave Turkey in a difficult position due to the future possible legal problems. This situation will reveal the existed commercial arbitration laws, and international firms getting right of disposition in Turkey's water resources will bring this topic to international platform.

Rivers cannot be evaluated integrally. The classification of HPP's are being done like kind of from the smallest to the biggest type (under 100kW power is micro, 101-1000kW power is mini, 1001-10000kW power is middle sized and 10000 kW and more HPP's are large capacity power plants).

There are HPP's with various magnitude of power on every river. Whether this much of HPP's are economical or not is not a thing that is examined deeply. Some of those are done by PTD, Final PTD, Snap EIA Report and Final EIA report, and in each of them, it is obvious that those economic analysis were done due to the obligation. The maximum number of HPP in each river and tributary of that river were made, being made and planned to made in East Black Sea Basin due to its features. Some landslide lakes were taken into evaluation for HPP construction. In Sera Lake, a HPP is oper-

ating. However, a HPP is being thought in Trabzon-Çaykara Uzungöl.

It may be not right to oppose collecting water (reservoir, barrage lake) type of HPP and the type that works through transportation of water to turbines with the help of open or closed channels or tunnels without collecting any water but bloating and with a structure of deflection. However, it is certain that using natural resources with commercialism will result in negatively. Besides, it should be known that there is a global climate change in the East Black Sea region (Üçüncü & Çanlı, 2015; Çanlı, 2015). This condition is very important from planning to the operation stages. While one tries to develop the economy, he should be aware of the ecological balance that is an inseparable part of him and should also try to protect it. The HPP projects to be held should be done magnificently and should both protect economic and ecological balances, and this attitude should be supported.

Studies should speed up in order to increase the share of TEMSAN, which is making turbine production in domestic manufacturing in HPP sector.

While using the natural resource values riches, the best evaluation methods should be searched, the most suitable tools must be used, the method, essentials and techniques that will give the least damage to the environment should be chosen.

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