International Journal of Water Governance-Issue 01 (2015) 49–70
DOI: 10.7564/14-IJWG46

Regional energy trading—a new avenue for resolving a regional water dispute?

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The Coruh/Chorokhi river system is of great economic importance to both Turkey and Georgia because of its largely undeveloped but economically exploitable potential for hydropower. On both sides of the border a large number of hydropower projects are being implemented unilaterally in which private investors play the key role, following liberalisation of the energy sectors in Turkey and Georgia. This has been promoted in both countries, despite the resulting social and environmental costs, particularly in Turkey.

Negative effects – i.e., the changes in sedimentation and the river flow regimes – moving from upstream interventions in Turkey to downstream Georgia – have still not been resolved, and they will put electricity generation in Georgia at risk when the hydroelectricity plants start operating. This article explores regional disputes and the degree of cooperation that exists, and analyses the effect that the efforts of relevant actors to establish regional electricity trading are having on the current problems. The creation of a regional electricity market seems to be opening up a new avenue for cooperation also on water.

Key words: Coruh/Chorokhi river system, unilateralism, hydropower, international disputes, regional electricity trade, potential for dispute resolution

1. A new way to solve negative effects on transboundary rivers?

The body of literature dealing with conflicts and cooperation on transboundary rivers is overwhelming. While potential wars over water have been predicted by some (Starr, 1991; Starr & Stoll, 1988; Bulloch & Darwish, 1993), most have argued that transboundary rivers may also promote cooperation (Wolf, 1998, 1999). The many international river basin organisations already established and the numerous river agreements/treaties being concluded provide empirical evidence to support the latter view (see Transboundary Freshwater Dispute Database of Oregon University, Oregon State University, [n.d.]). However, cooperation is still lacking in a number of international river basins; it is not always the case that all

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riparian countries are party to an agreement; some agreements capture one issue only; and mandates of international river basin organisations are restricted in scope and authority.

The inherent problem of rivers crossing national boundaries is the unidirectional effect(s) on downstream countries deriving from interventions upstream. These unidirectional effects can be positive if, for instance, an upstream dam also provides for the regulation of floods and river flows in the downstream country which may, in the absence of an agreement, enjoy this benefit without contributing to costs. If negative externalities occur, costs are borne only by the downstream country, unless it has been agreed otherwise. If the advantage of location on a transboundary river is combined with economic strength and financial capacity, upstream states are in an even stronger position to impose costs arising from negative externalities on downstream users. Even mid-/downstream countries can impose costs on upstream countries if they have the political means to prevent them from utilising the river (Egypt on the Nile has enjoyed this position until recently (Cascao, 2009)). These constellations have been labelled by Zeitoun and Warner (2006) as 'hydro-hegemonic', reflecting the asymmetric power relations of riparian countries.

In order to stimulate cooperation on transboundary rivers, despite the unidirectional effects and asymmetric power relations, concepts have been developed for settling disputes over utilisation. First, there is the concept of benefit sharing which implies the sharing of benefits from the utilisation of the water rather than sharing water quantities (Sadoff & Grey, 2002; Phillips, Daoudy, McCaffrey, Öjendal, & Turton, 2006; Dombrowsky, 2009). Benefit-sharing arrangements for dams, for instance, can overcome the difficulty of funding large fixed costs if all riparian countries pool funds. A single- or multi-purpose dam project may make economic sense only when neighbours share costs and benefits, whereas it would be unviable for a single country; and a benefit-sharing arrangement for a jointly financed dam project can favourably compare with national projects in financial terms (USA and Canada on the Columbia River; South Africa and Lesotho on the Senqu-Orange) (Hensengerth, Dombrowsky, & Scheumann, 2012). Second, inter-sectoral issue linkages are an option when two issues can be negotiated simultaneously, such as exchanging oil/gas for water (Kirgizstan and Uzbekistan), or security for water (Turkey and Syria). And third, intra-water sector issue linkages are an option if riparians that share more than one river hold reverse positions (the US is the upstream riparian on the Rio Colorado and Mexico downstream; Mexico is the upstream riparian on the Rio Grande and the US downstream) (LeMarquand, 1977; Dombrowsky, 2010).

Already Sadoff & Grey considered benefits 'from' and 'beyond' the river, the former covering water-related economic benefits when developing, e.g. hydropower, while benefits beyond the river relate to infrastructure, markets and trade, which would improve as a result of benefits derived because of the river (2002, p. 393). One may add another type of benefit – one that accrues not from the river/water sector, but from dynamics outside the river/water. There is a question to be asked about how dynamics in other sectors stimulate or influence cooperation over water. Durth's study found that regional integration in the European Union (prior to the enactment of the European Water Framework Directive 2001) supported a high level of cooperation in settling upstream-downstream problems. The conclusion of river agreements benefited from the plurality of direct interactions.

In integrated environments, river-related use conflicts are no longer channelled only through the lens of foreign relations offices (holding a monopoly position in negotiations); instead, cooperation is driven by the diverse motivations of actors concerned, such as the ministries of water, environment, and infrastructure, state agencies, private corporations and civil society organisations (Durth, 1998, pp. 168–202).

In our analysis of the Coruh/Choroki River which is shared between Turkey and Georgia, we are looking at a specific (sub-) form of regional integration – electricity/energy trade – and ask whether, and under what condition, this form is conducive to the resolution of a negative unidirectional upstream-downstream problem. The hydro-political constellation on the Coruh/Chorokhi river system resembles well-known constellations of unilaterally pursued hydropower projects, for instance on the Upper Mekong River and the Euphrates-Tigris by the more powerful riparian states China and Turkey. There the unidirectional upstream-downstream problem has not led to cooperation, but to increased disputes. What, then, are the differences that explain river cooperation?

Based on information on the river system's geography and hydrology, and on the unilaterally pursued hydropower plans of Turkey and Georgia, respectively, this article analyses the transboundary issues between Georgia and Turkey, and the current state of collaboration. It then investigates how the importance of the topics being negotiated changed as both countries entered into electricity trading, which has opened up a new avenue for resolving the upstream-downstream dispute.

This study is based on empirical research in Turkey that took place in 2009, and which was updated in 2014 by reviewing literature and documents and conducting interviews. Georgia-related analysis is based on a thorough literature review and a short field visit in August 2013.

2. Unilateral hydropower development in the Coruh/Chorokhi river system

The Coruh/Chorokhi[1] river system is of great economic importance to Turkey and Georgia because of its largely undeveloped but economically exploitable potential for hydropower. At the same time, it is one of very few river systems in Turkey, as well as in Georgia, to have remained mostly pristine. Over the last decade this has been changing with a large number of hydropower projects planned and under construction on both sides of the border.

2.1. Geography and hydrology

The Coruh/Chorokhi river system is shared between Turkey and Georgia. Approximately 91 per cent of the drainage area (21,100 square kilometres (m^2)) is in Turkey, while Georgia's share amounts to only 9 per cent. Its principal tributaries in Turkey are the Tortum and Oltu rivers, and the Macahel/Machakhelistsqali[2] and Adjaristsqali rivers in Georgia. The Coruh river has a total length of 431 kilometres (km), of which 410 km are

[1] Both names *Coruh* (in Turkish)/*Chorokhi* (in Georgian) will be used where appropriate.
[2] Both names *Macahel* (in Turkish)/*Machakhelistsqali* (in Georgian) will be used where appropriate.

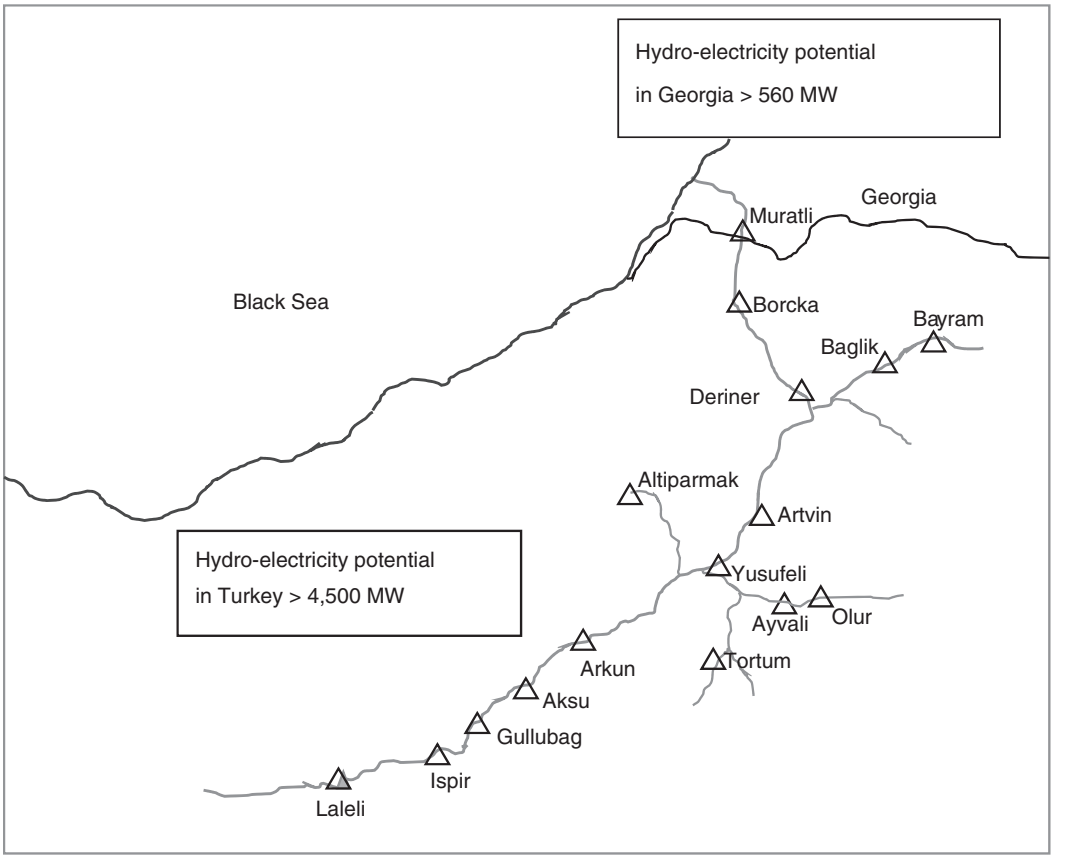

Figure 1. Coruh/Chorokhi river system, with dams on Turkish territory (Ministry of Forestry and Water Affairs, 2014)

situated within Turkey's borders; for 3 km the river marks the border between Turkey and Georgia, and then flows the last 21 km through Georgia before it discharges into the Black Sea (Figure 1) (Sezer, 2009; Suce & Dinc, 2008).

The river has its source in the western part of the Mescit Mountains in Turkey, at a height of over 3,000 metres, north-west of the Erzurum-Kars Plateau. From these mountains it first flows west, then turns east in a sharp bend on the Plain of Bayburt and thereafter follows a tectonic hollow which separates the Eastern Black Sea coastal mountains from the inner mountain range. The Coruh valley in the eastern part of Ispir is one of the deepest valleys in Turkey. Having passed the city of Yusufeli and the confluence with the Oltu river, the Coruh flows north and forms a mountainous landscape with deep canyons. Passing through the cities of Artvin and Borcka, it leaves Turkish territory north of the city of Muratli. South of Batumi, the capital of the Georgian semi-autonomous province Adjaria, the river empties into the Black Sea through a delta which is largely composed of alluvium that it has accumulated. The high levels of sediment and deposits that the river carries stem from erosion in the Turkish mountain regions (Berkun & Aras, 2012, p. 301).

The Adjaristsqali river is a national tributary of the Chorokhi; the Macahel/ Machakhelistsqali river is transboundary in nature. It also originates in Turkey on the northern slopes of the Mescit Mountains at an elevation of 2,200 m where it crosses the Turkish-Georgian border. It flows into the Chorokhi river on Georgian territory 21 km from its mouth. The total length of this tributary is 37 km, of which 21 km are in Georgia; it drains an area of 370 km^2. Its annual average flow is 16.15 m^3/s (Ministry of Energy and Natural Resources of Georgia, 2011).

The river system has high potential for hydropower generation due to the conditions of climate and topography, in particular, the steep gradient of the river from high mountains to sea level. The river system carries plenty of water in all seasons albeit with remarkable seasonal variations (Yildiz, 1999a). According to long-term observations at the Muratli monitoring station in Turkey, the average flow rate is 202 m^3/s. The highest run-off measured at this station was 2,431 m^3/s and the lowest 37.6 m^3/s (Berkun & Aras, 2012, p. 300; National Political Dialogue, 2011, p.8). In spring, total water flow reaches 221.38 million cubic metres (MCM), constituting 40.9 per cent of the mean annual flow.

On both sides of the border, the Coruh/Chorokhi river basin shows a high degree of biological diversity and is home to a great number of species and habitats. The Turkish part of the Macahel river basin lies in the Karcal Mountains and hosts Turkey's only internationally recognised biosphere reserve, the UNESCO Camili Biosphere Reserve, established in 2005 (UNESCO, 2011; Turkey InterCulture Magazine, 2012). Georgia, on the other hand, established the Machakheli National Park in 2012, and signed the Transboundary Cooperation Action Plan with Turkey (Jordania et al., 1999 quoted in Ministry of Energy and Natural Resources of Georgia, 2011; DG Consulting Ltd & Adjaristsqali Georgia LLC, 2013, p. 8).

2.2. Unilateral hydropower programmes

Exploitation of the hydro-electricity potential in both parts of the river basin is unilaterally pursued and not based on consultations between the two countries concerned.

Hydropower development in Turkey Until 1982, only a minor portion of the Coruh river was used for economic and recreational purposes, of which the most relevant were withdrawal for domestic usage and in-stream activities such as kayaking and boating. The latter has enjoyed an increase in recent years and provides significant added value to regional tourism. Because of the topography of the basin, agriculture is of lesser importance, and the expansion of irrigated areas plays a minor role in development.

Today, the most important pressure on the river system and its ecosystem comes from the government-supported programme to develop the potential for hydropower generation. Because of favourable topographic conditions, the Coruh river – according to estimates by the Turkish State Hydraulic Works (DSI) – carries 13 per cent of the usable hydroelectric power in the country (Berkun & Aras, 2012, p. 300; Akpinar, Komurcu, & Kankal, 2011), and has the potential to provide about 8 per cent of the country's energy and 28 per cent of its hydro-electricity demand (DSI, 2011, p. 32). Initial studies had

already been carried out by Turkish authorities in the late 1960s. The Coruh Master Plan was eventually finalised in 1982 and was followed by the Coruh Basin Development Plan. According to this plan, 15 storage dams[3] and 106 run-of-river diversion schemes are to be built, with a total installed capacity of above 4,500 Megawatts (MW) (DSI, 2011, pp. 32–37; see Annexe for information on the large projects). Out of the total hydropower potential, about one-third is auctioned according to the Electricity Market Law (No. 4628). Turkey plans to also exploit the potential for hydropower of the transboundary Macahel/Machakhelistskali tributary by constructing eight hydropower plants, of which two licences are on hold, awaiting court verdicts.[4]

Turkey enacted this law in 2001 to develop an electricity market operating in a competitive environment. The law covers generation, transmission, distribution, wholesale and retailing of electricity, and it mandated an independent public institution, namely the Energy Market Regulatory Authority (EMRA), with responsibility for issuing new licences, determining eligible customers, enforcing third-party access and regulating tariffs. The Law on the Utilisation of Renewable Energy Resources for the Purpose of Generating Electrical Energy (No. 5346), which came into force in 2005 and which was amended in 2011, provides an attractive incentive package for private investors. The law entails a fixed, guaranteed price over the first ten years of operation for companies holding a retail sales licence; retail licence-holders must buy 8 per cent of electricity per year from renewable energy certificate holders; renewable energy generators pay only 1 per cent of the total initial licensing fee and are exempted during the first eight years of operation (PWC, 2012, pp. 10–14; IEA, 2010, pp. 103–104).

The favourable economic framework has brought about a rush for licences, which is usually led by small Turkish national companies. These small national companies either link up with large Turkish companies or sell the licences to companies that are more experienced and have better internationally connections. When Turkey removed access barriers for international companies to the Turkish market in June 17, 2003 with the Foreign Investment Law, international investors showed a keen interest in taking part in these hydropower projects, and numerous joint ventures have been established (Interview BM Group, 2009; Interview Dolsar Consulting, 2009).

While the Turkish government has successfully established favourable economic frameworks for private investors, it has been less concerned with strengthening environmental supervision regimes and improving resettlement planning and practices. This failure has exposed people to risks, and people have responded accordingly.

Throughout the Eastern Black Sea Region, groups and individuals[5] are demanding a voice in decision-making on hydropower projects, and are no longer only concerned about the technicalities of compensation and resettlement practices (Scheumann et al., 2014). Experts, academics, civil society and non-governmental organisations (NGO), the

[3] Among them are the Muratli, Borcka, Deriner, Yusufeli and Artvin dams.

[4] These are the Duzenli plant, whose licence-holder is Gulkar Energy; and Sarnic 1-2 whose licence-holder is Daglar Energy. Both pulled out of the project.

[5] Http://www.hurriyetdailynews.com/default.aspx?pageid=438&n=dams-not-so-clean-as-pretended-to-be-2010-07-21, access 13 February 2014.

Union of the Chambers of Turkish Engineers and Architects (TMMOB), a public umbrella organisation with 23 chambers and about 300,000 individual members), and its member organisations, the Chamber of Civil Engineers (TMMOB-IMO), Electrical Engineers (TMMOB-EMO) and Environmental Engineers (TMMOB-CMO), are all sceptical about the government's massive river development programme.

Motivations are diverse; some are part of broader criticism of the state's role in a neo-liberal environment. The TMMOB–IMO criticises the liberalisation of the energy sector and the selling-off of national resources to international companies, and the Chamber argues in favour of water resources becoming a public good (Onal, 2011). The groups that are united in the Platform of the Brotherhood of Rivers (DEKAP), and that come from 54 valleys located in the provinces of Artvin and Sinop, are not interested in engaging in megawatt-debates and minimum in-stream flow requirements, but in protecting their way of life. They also argue that their water-use rights with respect to rivers are not protected by national law. Water-use rights would be recognised only if people held an official licence, which would ignore the de facto use of water and the river (TMMOB-IMO, 2011; Kibaroglu & Baskan, 2011; Islar, 2012). Although they emphasise that they are not 'environmentalists', they nevertheless question whether the government would even respect legally protected areas such as national parks (statement Diyarbakir, 2011).

Meanwhile, numerous lawsuits[6] were filed against hydropower projects in the Eastern Black Sea Region, which resulted in the cancellation of dam projects on the rivers in the Ikizdere valley in the first instance, on the grounds that the submitted Environmental Impact Assessment (EIA) reports were inadequate or misleading, or that projects were to be built in protected areas (see Konak (2011) on verdicts of the Provincial Court of Rize). The hydropower projects planned in the Firtina Valley, which is located on the northern slopes of the Kaçkar Mountains and which is part of the Kaçkar Mountains National Park, were also halted in 2005 after a long court battle.

The AKP government and parliament have nevertheless removed social and environmental barriers, thus accelerating hydropower development in a liberalised framework on an unprecedented scale. Two recent pieces of legislation have weakened the status of protected areas and the rights of people affected. First, an amendment (Law No. 6094) to the Renewable Energy Law (Law No. 5346) which allows the construction of dams in – and close to – protected areas, was passed by parliament in December 2010.[7] Second, also in December 2010, parliament decided that cabinet orders can decree "urgent expropriation"

[6] Estimates range between 83 and 65 court cases, of which 29 would have resulted in either the cancellation of the project, or in a freeze, as of 2011. According to DEKAP, the number had reached 108 by December 2013 (http://www.lazhaber.com/rize-haberleri/rizedeki-hes-ile-ilgili-yeni-karar-h26101.html, access 24 February 2014).

[7] A draft Nature and Biodiversity Conservation Act was submitted to parliament in the same year, but withdrawn by the AKP faction at the very last moment because of the Taksim Gezi Park protests ("Timeline of Gezi Park," 2013). The draft intended to shift authority from local protection boards to a National Biological Diversity Board, which can grant permission for hydropower projects to be built in protected areas. It was feared that the national board would overturn the local boards' decisions, revoking the protection status of all nature reserves.

of immovable property, on the basis of Article 27 of the Law on Expropriation No. 2942,[8] which weakened affected people's right to file lawsuits.

After long court battles in provincial and national courts, the status of the EIA was weakened further. The Provisional Article 3 of the Turkish EIA Directive, which allows hydropower projects to be exempted from the EIA requirement, obtained the status of law when it was amended to 1983 Environment Law in April 2013 (Official Gazette No. 28661, 29 May 2013). The Provisional Article 3 ruled that hydropower projects can get the final licence without environmental (social) clearance, irrespective of EMRA's rules which determine that a project can only take off if it has obtained environmental clearance from the Ministry of Environment. Gaining now the status of a law, this means that plaintiffs can no longer approach the *Danistay*, i.e. the highest administrative court whose rulings are final in the sense that there is no higher institution to appeal to (Scheumann et al., 2014).

Hydropower development in Georgia According to the Georgian Ministry of Energy and Natural Resources, Georgia's potential for hydropower is largely undeveloped: currently, only 25 per cent of its total generation potential is realised (Ghvinadze & Linderman, 2013; USAID, 2012a). Up to now, Georgia has used water from the Chorokhi river system only for its domestic water supply and irrigated agriculture, which is practised on a small scale directly alongside the river; fishing and water for livestock are more important.

Similarly to Turkey, the Georgian government has been promoting hydropower development by means of liberalising the energy/electricity sector from 2004 onwards, and has created attractive incentives for investors, Turkish companies being among them. The electricity sector is almost fully liberalised and privately owned, with the exception of transmission, dispatch and large hydropower plants (HPP). According to Yildirim, Nanobashvili, and Sharabidze, (2011), export of electricity is completely deregulated; wholesale generation tariffs are fully liberalised and any generation company is permitted to sell electricity to any wholesale customer at the tariffs negotiated. There is no fee for being connected to the grid and no licence is required to export electricity. Georgia offers guaranteed purchase prices only for the three months of winter when electricity is to be sold to Georgian consumers, owing to seasonally high demand. "Georgia has been a net exporter of electricity since 2007, and since 2010 Georgia has exported energy to all its neighbouring countries" (Tavdumadze, 2013). Turkey is seen as the most attractive market for Georgian electricity exports because "the price of electricity in the Turkish private wholesale market is among the highest" (Ghvinadze & Linderman, 2013, p. 3; KfW News, 2013).

The hydropower plants along the Chorokhi and on its national and transboundary tributaries are small to large in size, and based on run-of-river diversion schemes. Investments made are of the Build-Own-Operate (BOO) type[9] and based on memoranda of

[8] Http://www.erdem-erdem.av.tr/erdem-erdem.php?katid=12110&id=15139&main_kat=15132 (access 24 August 2013).

[9] BOO grants a company the right to develop, finance, design, build, own, operate and maintain an HPP.

understanding (MoU) signed between the investor and the Government of Georgia, represented by the Minister of Energy and Natural Resources (Green Alternative, 2012, 4ff.). Georgia plans the construction of three cascade hydropower projects (Table 1), two of which rely on dam operations in upstream Turkey, namely Machakhela 1 and 2, and the Chorokhi Downstream Project.

Machakhela 1 and 2 hydropower plants are located on the Georgian stretch of the Machakhelistsqali river upstream of the confluence with the Chorokhi river. The main intake captures flow from the Machakhelistskali river just downstream of the Georgian border with Turkey. The projects are carried out by Machakhela HPP LLC on the basis of the Memorandum of Understanding signed on 24 May, 2012.[10]

Along the main branch of the Chorokhi river, three hydroelectric plants are planned and under construction. Kirnati HPP is located 6 km downstream of the Turkish Muratli dam near the village of Kirnati and Maradidi. It operates with five units and can thus adjust to changes in river flow caused by upstream dam operations. Khelvachauri HPP I is located near the village of Erge and will generate electricity with water from the rivers Chorokhi (released from the Muratli dam) and Machakhelistsqali. Khelvachauri HPP II is located near the village of Makho and will use water of the rivers Chorokhi (released from the Muratli dam), Adjaristsqali and Machakhelistsqali (Gamma Consulting, 2011). The investor is Achar Energy 2007 Ltd, a subsidiary of the Turkish Eksim Yatirim Holding. The Memorandum of Understanding was signed on 1 July 2011. The project has

Table 1
HPPs in Georgia on the Chorokhi river system (as of January 2014).

River	Hydropower plants (MW)	Project developer/operator
Coruh	Kirnati HPP (35 MW) Operation in 2017	Achar Energy 2007 Ltd
	Khelvachauri HPP I (42 MW) Operation in 2017	Achar Energy 2007 Ltd
	Khelvachauri HPP II (35 MW) Operation in 2017	Achar Energy 2007 Ltd
Machakhelistsqali	2 HPPs (28 MW + 27 MW) n.a.	Machakhela HPP LLC
Adjaristsqali	Shuakhevi HPP (185 MW) Operation in April 2016	Clean Energy Invest, Indian Tata Power and IFC
	Koromkheti (150 MW) Operation in 2019	Clean Energy Invest, Indian Tata Power and IFC
	Khertvisi HPP (65 MW) Operation in 2020	Clean Energy Invest, Indian Tata Power and IFC
Total	567 MW	

Source: Ministry of Energy and Natural Resources of Georgia. (2014). *Hydro-electric power stations*. Retrieved from http://www.energy.gov.ge/investor.php?id_pages=18&lang=eng; Human Dynamics public sector consulting (2013).

[10] Http://www.esco.ge/files/meorandum_eng.pdf, access 14 February 2014.

been submitted to the UNFCCC Clean Development Mechanism (CDM) but is yet not registered.

The Adjaristsqali hydropower cascade on the Adjaristsqali river comprises three schemes which do not depend on Turkish dam operations, namely the Shuakhevi, Koromkheti and Khertvisi units (Mott MacDonald, 2011). The cascade project is carried out by a consortium consisting of Indian Tata Power (40 per cent), Norwegian Clean Energy Invest (40 per cent) and IFC InfraVentures (20 per cent). The agreement between the private investors and the Georgian government was concluded on 19 June 2011. The project was registered under the UNFCCC CDM on 1 November 2012.[11]

3. Potential impacts of Turkish hydropower projects on Georgia

The Turkish hydropower projects affect the sediment and water flow regimes of the river system, hence the utilisation in downstream Georgia.

3.1. Impact on the sediment regime

The most serious transboundary impact of the dams built (and being built) in Turkey is the expected drastic change in the river's sediment regime, and resulting erosion problems along the Georgian Black Sea coast.[12] Georgian authorities and ecologists claim that the Turkish dams will stem the drift of the solid element of the river flow, in particular sand and other alluvial materials that are characteristic of the river and shape the coastal region (Berkun & Aras, 2012; Jaoshvili, 2003; Radio Free Europe [REF]/Radio Liberty [RL], 1998). The coastline around Batumi is formed by these alluvial materials, when the river deposits sand, gravel and debris at the river mouth and the surrounding coast, which thus counteracts the erosive action of the sea. Consequently, the most serious of the anticipated effects of the dams upstream in Turkey could be increased coastal erosion, which might threaten not only ecosystems and beaches near the river's delta, but also local fisheries and urban areas in the agglomeration of the city of Batumi.

Clearly, it is not only the dams built on Turkish territory that pose problems to the coastal protection in the region of Batumi: Dams built on the Georgian rivers Enguri and Rioni have had the same effect in allowing the erosion by the Black Sea to outpace the natural replenishment provided by the rivers. Furthermore, the Georgian coastline protection department granted licences to private companies to extract sand and gravel from the river bed. Since the extraction started, erosion processes have worsened, resulting in the

[11] Georgia is a Non-annex I party and can participate in CDM projects. Financial resources and additional revenues can thus be raised from CDM (Pirveli, 2012).

[12] Berkun & Aras estimate that more than 17 MCM of sediment would be trapped in Turkish reservoirs, while under natural non-modified conditions the sediment load reaching the Black Sea from Turkish rivers (not only the Coruh) would be a minimum of 25-26 MCM (2012, 302).

flooding of the delta (CENN Weekly Digest, 2007). Extractions also cause the dislodging of pollutants (sodium, magnesium, calcium, manganese, antimony, sulphate and chloride) which are transported into the Black Sea (Delineation Report Georgia, 2013).

3.2. Impact on the river flow regime

Operations of the Muratli dam in Turkey have already affected fishermen and cattle farmers in the most downstream reaches of the river in Georgia because of the artificial floods they create. Users were not informed in advance of the start of operations and were surprised by quickly rising water levels in the river bed (Interview Guchmanidze, 2013).

If operations of the many hydroelectric power plants along the river system are not regulated, they may affect electricity generation in Georgia (on the Coruh and Macahel), and increase risks and uncertainty for the private operators. It is particularly the Muratli dam located closest to the Turkish-Georgian border that changes the water regime (Figure 1). According to Achar Energy 2007 Ltd, the Muratli dam works in on-off mode, meaning that one or both turbines are fully operational, thus guaranteeing a downstream flow of either 180 m^3/s or 380 m^3/s (Gamma Consulting, 2011, p. 126). However, a minimum flow from the Muratli dam to safeguard the health of the river ecosystem is not determined (14 m^3/s are to be released only during the filling of the reservoir).

Taking into account the reliance on upstream operations, the Environmental and Social Impact Assessment reports issued by Achar Energy 2007 Ltd and Clean Energy Invest AS cover all projects along one section of the river (cascade), and developed scenarios for operating Khelvachauri I and II:

1. The HPPs use water discharged from the Muratli HPP, plus water from the Machakhelistsqali river and the full flow of the river Acharistsqali, if Acharistsqali HPPs are in working conditions and are not filling the reservoir.
2. The HPPs use only water discharged from Muratli HPP, when the Acharistsqali HPP cascade is not operating and is filling the reservoir.
3. The HPPs only use water discharged from Acharistsqali HPP, when Muratli HPP is not functioning (Gamma Consulting, 2011, p. 126).

For the hydroelectric power plants on the main branch of the Coruh river and its transboundary tributary, the Macahel, coordination of operations is necessary, in particular with the operator of the Muratli HPP in Turkey (the Turkish electricity generation company EÜAS), and the operator of the Adjaristsqali HPPs (Clean Energy Invest et al.).

4. Status of river cooperation

Negotiations benefited from the overall good economic and political relations between Turkey and Georgia but they have yet not resulted in a comprehensive bilateral agreement comprising rules and regulations on how to govern and manage the sediment and water flow regimes (as of February 2014).

4.1. Cooperation related to the sediment regime

Already the Soviet government expressed concerns in the 1980s via diplomatic channels about the possible environmental impact of the planned dams, and requested a joint investigation.[13] After the demise of the Soviet Union Georgia first expressed concerns about Turkey's Coruh River Development Programme in 1994. Then, both countries entered a phase of bilateral technical cooperation in the form of a series of technical meetings in 1994 and 1995 (Yildiz, 1999b). Turkey proposed to plan future dams in a bilateral manner (benefit sharing) and invited Georgia to enter into a broader Turkish-Georgian cooperation relating to joint energy projects over the Coruh/Chorokhi river. These joint projects were designed in such a manner that Georgia would receive compensation for potential damages from the dams already in operation. Georgia's government, until recently, put the main emphasis on the negative environmental impacts (sediment, coastal erosion) of the Turkish dams already operating, and was neither prepared nor willing to negotiate bilateral cooperation on future joint dams, inter alia because of different priorities in energy policies. However, this has changed in the meantime.

Between 1997 and 1998, the Coruh/Chorokhi issue then entered political consultations at the ministerial level. During an official visit by a Georgian delegation to Ankara in 1998, Turkey officially recognised Georgia's concerns. On that occasion, the Turkish delegation also stated that conditions were not suitable for signing an agreement concerning the environmental (sediment) impact of the dams, because of incomplete and insufficient information. Moreover, the Turkish side renewed the idea of broadening water cooperation and embracing projects that would potentially bring mutual benefits, but Georgia referred to the aforementioned coastal erosion at Batumi and the surrounding area during the negotiations in 1997 and 1998, and proposed a cost assessment for measures needed to alleviate the problem, which would then be funded by Turkey. However, Turkey's position on the impact of the dam maintained that there still was a lack of reliable data and that future action to alleviate the possible effects should be determined in light of hard scientific evidence that could only be collated once the dam was installed. Turkey took over the financing of two monitoring stations in Georgia to measure the river flow rate (at this time, Georgia had no functioning monitoring infrastructure).[14] Both disagree on the magnitude and related costs of the expected impacts on the Georgian coastline and the possible acceleration of erosion in the Batumi region. While representatives of the Georgian Ministry for Environmental Affairs are expecting costs for mitigation and prevention measures to be around US$ 150 million, others estimate a much lower financial burden (Interview with head of the water department of the Georgian Ministry for Environmental Affairs, November 2004). Rough calculations for more modest coastal protection measures amount to only US$ 5 million.[15]

[13] This section draws from Klaphake & Scheumann (2011).

[14] According to Georgian media reports, Georgia failed to meet its commitment to maintain the monitoring stations that had been damaged and that now lie derelict.

[15] The leader of the Georgian Green Party, Giorgi Gachechiladze, has been credited with such an assessment in public media (*The Messenger*, 20 April 2005).

When the ceremony to mark the start of construction of Turkey's Deriner Dam took place in 1998, Georgia's then president Eduard Shevardnadze was one of the international participants. Following the ceremony, Georgia and Turkey agreed on the establishment of a bilateral group of experts to conducting joint studies that would identify, monitor and evaluate changes that might occur over time on the Georgian section of the river, including the mouth of the river and the Black Sea coastline. However, to date, these efforts have failed to provide a consensual scientific assessment. While representatives from the Georgian Environmental Ministry, environmental NGOs and the Georgian Green Party stress the substantial environmental impact, the Turkish ambassador in Georgia made a significantly less convinced-sounding statement to the media: "To date, expert analysis has not revealed any indication of the dam's environmental impact as claimed by certain circles" (cited in Kupatadze, 2005).

The Coruh/Chorokhi issue re-entered the bilateral political arena in the aftermath of the Georgian revolution. The imminent completion and filling of the Borcka and Muratli dams brought the ecological question again to the fore, and the necessary countermeasures were re-addressed (Yerman, 2004). Recently, the Tbilisi authorities, who are still seeking an adequate and satisfying agreement with Turkey, have suggested the possibility of involving a neutral third party who would facilitate and mediate joint environmental impact studies. Prevention and/or mitigation measures could then be designed accordingly, and the costs allocated.[16]

Table 2
Timeline of river-related cooperation between Turkey and Georgia.

Coruh/Chorokhi basin area: 21,100 km^2	
Turkey - Georgia	1927 – Border issues, river bank protection, water allocation, compensation requirements, joint commission1996 – meetings between Turkish General Directorate (GD) of DSI and the Georgian GD Coastal Zone Protection 1997 – Agreement on environmental protection including surface waters; exchange of information; creation of a joint commission 1998 – Series of meetings between Turkish and Georgian experts on e.g. construction of Deriner dam and on studies to be initiated. Protocol signed to jointly monitor sediments of the river and to study the impact of hydroelectric power plants on its lower reaches 1999 – Installation of two monitoring stations for river flow regime 2000 – Technical cooperation, river bed changes 2002 – Memorandum of Understanding (MoU) on cooperation for obtaining aerial digital maps of the river basin on Georgian territory for determining possible downstream and environmental impacts of hydraulic structures being built on the river and its tributaries 2003 – Series of meetings Agreed Minutes of Meeting held between delegation of Turkey and Georgia regarding the resolution of problems connected to the construction of dams on the river 2006 – Meeting in Ankara for exchanging views on issues concerning the river; a MoU was signed 2012 – Agreement between Georgia and Turkey Concerning Cross-Border Electricity Trade Via the Borcka-Akhaltsikhe Interconnection Line

Source: Klaphake & Scheumann, 2011; National Political Dialogue, 2011; USAID, 2012b.

[16] No efforts are under way to assess transboundary impacts (Georgia and Turkey are not party to the 1991 Convention on Environmental Impact Assessment in a Transboundary Context).

4.2. Cooperation related to the water flow regime

The most enduring water-related international agreement between the Soviet Union and Turkey dates back to the 1920s and covers, in general, water allocation and border demarcation of the border rivers. In 1927, they signed the *Protocol on the Beneficial Uses of Boundary Waters* which addressed, inter alia, the utilisation of the Coruh river, because for 3 km it forms the boundary between the two countries (Kurucim, 2002). The basic provisions of the arrangement were a fifty-fifty allocation of the water and several regulations concerning infrastructure and dam-building. A Joint Boundary Water Commission was established the same year. Since this agreement only applies directly to those sections of the river forming the border, it does not cover transboundary effects.

Both countries entered friendly political relations after the demise of the Soviet Union and the declaration of Georgian independence in April 1991. Turkey and Georgia signed the Friendship, Cooperation and Good Neighbourliness Agreement in 1992, which recognised previous agreements and treaties between Turkey and the Soviet Union. From the 2000s until today, a series of meetings have been held and memoranda of understanding signed, focusing on potential impacts in Georgia of dams constructed in Turkey (Table 2).

Related to this, at least two issues need to be resolved: (i) impacts caused by normal dam operations (the downstream flow from Muratli HPP is at least 180 m^3/s or 380 m^3/s), whether they relate to total stream flow, the seasonal timing or even hourly fluctuations (World Energy Council 2005, pp. 48–50); (ii) a minimum environmental flow from the Muratli dam needs to be determined to safeguard the river and the ecosystem services it provides, and this would benefit downstream HPP operations as well.

5. Cross-border electricity trading opens a new avenue for river cooperation

Today, Turkey is not only a principal political and a strategically important partner for Georgia, but also a very important trading partner and a favourable market for investments, including hydropower projects. Economic exchange between both countries has increased to an impressive degree in the last decade: Turkish-Georgian trade constitutes 17 per cent of the total international trade volume of the Georgian economy (Aras & Akpinar, 2011; Polyakov, 2000).

Both countries agreed to strengthen cooperation in general and electricity trade in particular, giving priority to electricity produced from renewable energy sources. For Georgia, Turkey is one of the most attractive markets for selling electricity, and Georgia, on the other hand, is an attractive market for Turkish investors in, among other things, hydropower projects, and is a surplus producer of electricity. It has already been agreed that the Adjaristsqali hydropower cascade will export 83 per cent of the energy produced to Turkey (Human Dynamics, 2013, p. 88). In January 2012, the Georgian Prime Minister Nika Gilauri announced that "more than 40 agreements have been signed with respect to construction of new hydro power plants (by Turkish investors)."[17]

[17] Http://government.gov.ge, access 9 July 2014.

The high electricity potential and unequal demands in both countries triggered the concluding of the Turkish-Georgian Cross-Border Electricity Trade Agreement (CBETA) in January 2013. Characteristic of both governments' endeavours is their interest in increasing mutually beneficial transborder activities which aim to establish a regional electricity market, namely the Black Sea Electricity Ring. When Turkey joined the European transmission network in 2011, it provided Georgia with the opportunity to sell into the lucrative European energy market after Georgia and Turkey signed the CBETA in January 2012 (USAID, 2012b).

The hydro-electricity trading scheme has been facilitated by the Alliance of Energy Ministers who, under CBETA, established a Joint Committee (Article 10) "to cooperate in the proper implementation of this Agreement, exchange information, resolve disputes, and conduct meetings and consultations" (USAID, 2012b), one topic being the mutual dependency of dam operations.

It remains to be seen whether the establishment of a regional electricity market, and in particular the setting up of a joint governing body, will also improve river cooperation. Unlike the 1990s, when Georgia rejected joint hydro projects, both countries have now made a move towards gaining benefits from regional energy cooperation.

6. Discussion

Water relations between Turkey and Georgia have benefited from overall good political, economic and trade relations. But as happens with any negative upstream-downstream effects on transboundary rivers, Turkey's hydropower programme on the Coruh river, with 15 storage dams and 106 run-of-river diversion schemes and a total installed capacity of about 4,500 MW, affects downstream Georgia in two ways: it increases erosion of the coast near the city of Batumi, and it will affect the operations of Georgia's HPPs (their installed capacity is about 560 MW) on the transboundary Coruh/Chorokhi and Macahel/Machakhelistsqali rivers once production has started.

In the course of negotiations, the sedimentation issue has moved backstage with the conclusion of the CBETA in 2012. The Georgian government is already unilaterally implementing mitigation means and it bears associated costs. It annually deposits 200,000 cubic metres of sand and gravel from another river delta as a means of technically compensating for the effects of a reduced sediment regime (200,000 cubic metres is assumed to be only 10 per cent of the amount needed to counteract sea erosion). This activity indicates Georgia's interest in maintaining a stable political and economic climate. Likewise, the fact that Turkey has taken on responsibility for funding the monitoring of the impacts of dams, and is willing to compensate for these impacts, demonstrates the particular care it is taking in its relations with Georgia. In this respect, collaboration has been successfully exercised in diplomatic negotiations between high-level officials even though differences have yet to be settled regarding the extent of impacts, the costs of mitigation and how to share these costs.

What the Government of Georgia and the private utility operators are more concerned about are the looming downstream impacts on hydro-electricity generation. International investments in Georgia are potentially affected by operations of the upstream Turkish Muratli dam (operated by the Turkish Electricity Company), and it is up to the Georgian government to reduce the risks international investors and operators face. In order to avoid negative impacts, operations schedules must be exchanged; harmonisation of hydro-electricity plants operations is needed; a regular exchange of hydrological and meteorological data is unavoidable, and the establishment of an early warning system is mandatory.

We have hypothesised that regional integration – in our case the integration of a (sub-)sector – can have positive repercussions for cooperating on transboundary water issues. Early proposals advanced by Turkey to jointly build hydropower dams (benefit sharing) were not accepted by Georgia; now the Turkish-Georgian CBETA can serve as an umbrella under which river-related disputes can be settled, and the Joint Committee established under CBETA can be instrumental in developing solutions.

It is this specific constellation that has the potential to open up a new avenue for river cooperation. It has reversed the unidirectional (negative) upstream-downstream pattern: while hydro-electricity plant operators in Georgia rely on river flows controlled by Turkey, Turkey relies on electricity generated in downstream Georgia. In this respect, the motivation to collaborate is high: Turkey's dependence on electricity imports from Georgia matches Georgia's dependence on water inflows from Turkey.

Looking at governance issues, and also reflecting on the actors involved, it is the liberalisation of both countries' energy sectors, the countries' unequal endowment with resources and the prospects of gains from the European market that have stimulated regional energy integration. The sediment issue was first the subject of negotiations between high-level politicians and officials from Turkey and Georgia, who agreed to set up bilateral expert groups (on the Georgian side it was the Ministry for Environmental Affairs). The regional electricity trading scheme CBETA with its Joint Committee was inaugurated by an alliance of Turkish and Georgian energy ministers. Settling the issue of impacts on hydro-electricity generation in Georgia will involve not only the powerful government energy agencies but also international private investors/operators since their revenues are at stake.

It is worth studying cases similar to the Coruh/Chorokhi river system shared between Turkey and Georgia. Whether the regional power pools in Africa, for instance, will facilitate cooperation in the realm of transboundary water management, needs to be investigated. The Eastern Africa Power Pool is a useful example because the energy ministers have already decided on a regional master plan and have adopted priority hydropower projects to be implemented (ICA, 2011).

While CBETA has the potential to settle transboundary issues, social and environmental impacts of hydro-power dams have yet to be adequately dealt with – both in Turkey and Georgia. In the domestic realm, liberalisation of the energy sectors has not brought about strong environmental supervision regimes and policies that protect people's rights.

Abbreviations

AKP	Justice and Development Party of Turkey (English translation)
BOO	Build-Own-Operate
CBETA	Cross-Border Electricity Trade Agreement
DSI	Turkish State Hydraulic Works (English translation)
DEKAP	Platform of the Brotherhood of Rivers (English translation)
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMRA	Energy Market Regulatory Authority
EÜAS	Turkish Electricity Generation Company (English translation)
HPP	Hydropower plants
IFC	International Finance Corporation
MCM	million cubic metres
MoU	Memorandum of Understanding
MW	Megawatts
NGO	Non-governmental organisation
TMMOB	Union of Chambers of Civil Engineers and Architects (English translation)
TMMOB-CMO	Chamber of Environmental Engineers (English translation)
TMMOB-EMO	Chamber of Electrical Engineers (English translation)
TMMOB-IMO	Chamber of Civil Engineers (English translation)
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC CDM	United Nations Framework Convention on Climate Change Clean Development Mechanism
US $	US Dollar

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Annexe: Dams/HPPs in the Coruh river basin in Turkey (as of January 2014)

Dams/HPPs at main branch	Capacity/Status	Project developer/Operator
Tortum Dam	26 MW/start in 1972	DSI/EÜAS
Murgul Dam	5 MW/start in 1951	DSI/EÜAS
Muratli Dam	115 MW/start in 2005	DSI/EÜAS
Borcka Dam	300 MW/start in 2007	DSI/EÜAS
Deriner Dam	670 MW/start in 2013	DSI/EÜAS
Artvin Dam	332 MW/start in 2015	Auctioned acc. Law No. 4628/ Licence: Dogus Energy
Yusufeli Dam	540 MW/construction ongoing	DSI/tendered on 21 November 2011
Arkun Dam	237 MW/construction ongoing	Auctioned acc. Law No. 4628/ Licence: Enerjisa Energy Production
Aksu Dam	134 MW/construction ongoing	Auctioned acc. Law No. 4628/ Licence: Calik Energy
Güllübag Dam	96 MW/start in 2012	Auctioned acc. Law No. 4628/ License: Senerji Production
Ispir Dam	54 MW/planning stage	Auctioned acc. Law No. 4628/ Licence: Not yet licensed
Laleli Dam	104.7 MW/construction ongoing	Auctioned acc. Law No. 4628/ Licence: Akfen Holding
. . . at Berta		
Bayram dam	92 MW/planning stage	Auctioned acc. Law No. 4628/ Licence: LNS Enerji
Baglik dam	59 MW/planning stage	Auctioned acc. Law No. 4628/ not yet licensed
. . . at Oltu		
Olur dam	65 MW/planning stage	Auctioned acc. Law No. 4628/ Licence: Idil Iki Energy
Ayvali dam	127.8 MW/planning stage	Auctioned acc. Law No. 4628/ Licence: Özdogan Energy
. . . at Barhal		
Altiparmak dam	50 MW/planning stage	Auctioned acc. Law No. 4628/ not yet licensed
Total	3,007.5 MW	1,351.5 auctioned acc. Law No. 4628

Source: T.C. Cevre ve Orman Bakanligi, Devlet Su Isleri GD. (2013). *DSI Coruh Projeleri 26. Bölge Müdürlügü, Artvin*. Retrieved from http://www2.dsi.gov.tr/bolge/dsi26/artvin.htm