



REPORT ON THE INTERNATIONAL PRACTICE ON INTERSTATE WATER–ENERGY COMPENSATION MECHANISMS



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1. Introduction

This report has been prepared as part of the USAID Regional Water and Environment (WAVE) Activity (Project), which is a five-year project aiming to strengthen water cooperation in Central Asia. One of its main objectives is to support regional and national initiatives on transboundary water cooperation and water management issues. Water and energy matters have a special place within the framework of the water sector reform currently being carried out in the Kyrgyz Republic. They also have a particular connotation for the Kyrgyz Republic from a historical and transboundary perspective that is described in more detail in the scope of work of the terms of reference (ToR) of the international expert author of this report.

To the point and purpose of this report, the current situation is that Kyrgyzstan accumulates water in the reservoir of the Toktogul dam on the Naryn river, a tributary of the Syr Darya, during the winter period to satisfy its obligations to share water with its riparian neighbours in the summer period. While this accumulation takes place from September to April, Kyrgyzstan is unable to produce electricity and must import power from the same neighbours, which is paid for at market prices based on commercial contracts. Therefore, Kyrgyzstan is facing a 'loss' of usage of water during winter and paying for the electricity it would otherwise be producing. There is an asymmetry in that regard and no regional mechanism facilitating a constructive dialogue between the riparian countries in Central Asia on this particular issue of the connection between water and energy resources and how to make it equitable for all regional riparian countries. The review of interstate agreements containing compensatory mechanisms in this report is intended to support the development of concrete proposals and a search for compromises, a change in strategy and new conditions for the introduction of market mechanisms. These are also part of the review.

A preliminary comment is that water-energy compensation mechanisms have not been the focus of scholarly investigations and publications. This is therefore an area that, so far, relies principally on agreements as examples of state practice without the benefit of detailed and thorough legal or policy academic study. Nevertheless, some of the agreements reviewed have been the topic of scholarly literature and, where useful, relevant observations drawn from these publications are included.

Report content

This report addresses ToR Tasks 1, 2 and 3, which are:

- Task 1: a detailed analysis of international practices on interstate relations in water management using various compensation mechanisms based on a review of a minimum of five agreements (three of which were explicitly referred to: the Columbia River Agreements between the US and Canada; the Colorado, Tijuana and Rio Grande Agreement between the US and Mexico; and the Water Agreement between Turkey and Bulgaria).
- Task 2: a report detailing: the operating conditions of compensation mechanisms including the mechanisms for the execution of decisions by authorized power structures on the basis of generally recognized norms of international law and interstate agreements; and a determination of the advantages and disadvantages of

market relations in the management and use of water resources in international practice.

- Task 3: the development of recommendations and the presentation of various possible scenarios for the water-energy mechanism in terms of an integrated approach taking into account the interests and positions of countries based on international water law.

This report also incorporates the following points that were raised during an expert online meeting on 24 October 2023:

- Economic aspects: these aspects and underlying commitments and responsibilities particularly in the context of the Mekong and between Cambodia, Laos, Myanmar and China.
- Commoditization: is water dealt with as a commodity in any of the mechanisms, in other words is there a large-scale trade in water?
- Limitations: are there any limits to amounts of water withdrawals in the mechanisms?
- Proportionality: is proportionality addressed in the mechanisms, and if so, how? Is it a proportional allocation or a proportional sharing of the benefits derived from the allocation?

The report also addresses the following points that were discussed during an expert online meeting on 19 February 2024:

- Costs and economic losses: how are these addressed in the case studies?
- What are the advantages and disadvantages of each case study in relation to the situation in Central Asia?
- How is water scarcity addressed in water treaties?

To address the points raised in Tasks 1, 2 and 3 and in the two online meetings, this report contains the following sections:

- Elements of analysis: this section explains the different elements that have been taken into account for the analysis of the agreements of the case studies and how they are presented for each case study.
- Case studies: this section contains the review and separate analysis of seven agreements, which are the three identified in the ToR and three additional agreements: the Mekong Agreement, the Lesotho and South Africa Agreements on the Lesotho Highland Water Project; the Swiss and French Agreement on the Emosson Hydropower Project; and the India and Bhutan Agreement on Cooperation in the Field of Hydroelectric Power.
- Analysis: this section compares the analysis of the seven agreements and draws general conclusions.
- Market relations assessment: this section describes and assesses market relations in a transboundary water cooperation context.

- Recommendations: this section contains three recommendations regarding the development of an economic mechanism.
- Conclusion: this section concludes the report by highlighting key points and connecting the conclusions of the different sections.

The USAID Regional Water and Environment Activity would like to express gratitude to the international expert Zaki Shubber for preparing this report.

Elements of Analysis

This section lists and describes the different elements presented for each agreement reviewed. These elements relate to the points highlighted in the ToR as well as the additional ones mentioned during the online meetings of 24 October 2023 and 19 February 2024. Supplementary elements that provide relevant background context are also included as well as any other information that might help to better understand the compensatory components.

Where available,¹ the following elements are included:

1. A background overview of the case study, including basic basin geography and a map
2. A brief description of the agreement and its current known status
3. A summary of its key elements: scope, substantive and procedural rules, institutional mechanisms and dispute settlement²
4. A detailed explanation of the compensation mechanism including costs and losses, where applicable
5. A description of any mechanism for executing decisions by authorized power structures
6. Comments on the following points if included in the agreement:
 - Economic aspects
 - Water commoditization
 - Withdrawal limitations
 - Proportionality allocation, including scarcity elements where applicable
7. General analysis of the agreement and specific analysis on advantages and disadvantages with regard to the situation of Kyrgyzstan
8. List of references and resources consulted

¹ In some cases, there is limited information available and not all elements can be covered.

² This framework is based on the 'legal assessment framework' developed by Patricia Wouters (International Law – Facilitating Transboundary Water Cooperation, TEC Background Paper No.17, GWP 2013 @ <https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/17-international-law---facilitating-transboundary-water-cooperation-2013-english.pdf>).

2. The Case Studies

This section contains the seven case studies in the following order:

1. US-Canada Columbia river
2. US-Mexico Colorado, Tijuana and Rio Grande rivers
3. Bulgaria-Turkey Maritsa River
4. South Africa-Lesotho Highlands Water Project
5. Mekong river
6. French-Swiss Emosson dam
7. India-Bhutan hydropower cooperation

Cases 1, 2, and 4 are more substantial in content than others. The sections for these case studies are, accordingly, longer than the others.

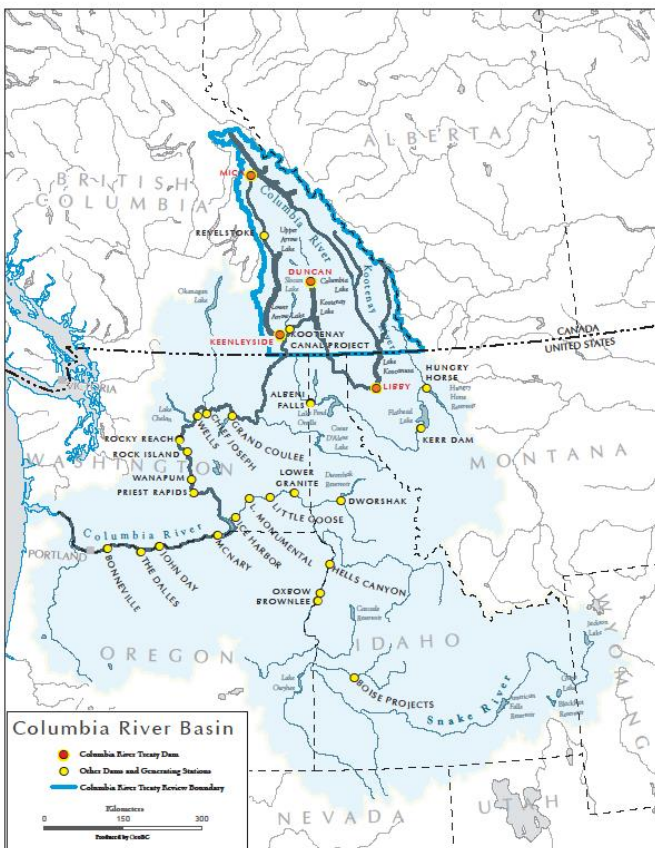
2.1 The US-Canada Columbia Treaty

3.1.1. Background

The Columbia River Basin is one of the largest river basins in North America. It covers 671,200 km² starting in Canadian British Columbia and including Washington, Idaho, Montana, Oregon, Nevada, Utah and Wyoming in the US. While 15% of the basin is in Canada, its contribution to the average flow and runoff is 40%. It has ten tributaries. After meandering through five mountain ranges in Canada and the US, it discharges into the Pacific Ocean in Astoria in Oregon in the US. High mountain snow melt and precipitation contribute to its powerful flow.

It is considered of the most hydroelectrically developed river systems worldwide: it has over 470 dams on its main stem and tributaries mostly built between the 1940s and the 1980s. The basin represents approximately 40% of all US hydropower and provides half of the electricity generated in Canadian British Columbia.

Basin map:



Source: British Columbia website³

3.1.2. Treaty background and status

Substantial floods in 1948 and a growing population in each country increasing energy demand triggered the move for bilateral cooperative water management. It ultimately led to

³ <https://engage.gov.bc.ca/columbiarivertreaty/map/>.

the entry into force in 1964 of the US-Canada Columbia Treaty (Treaty) for the purpose of hydropower production, coordinated dam operation for optimised power generation in both countries and flood reduction and control coordination. Consequently, three hydro-electric dams were built in Canada and one in the US. The US paid Canada US\$64 million for a 60 years period for the flood controlling storage and agreed to provide half of the incremental hydropower potential produced to Canada.⁴ Importantly, the Treaty should also be seen as one element of a wider bilateral transboundary water context: there is an overarching agreement for 1909 on those issues that established a joint body (the International Joint Commission, IJC) that has been operating since then.⁵ In fact, the IJC played an important role in the development of the Treaty.⁶

Importantly, the Treaty is currently being re-negotiated. It does not have a termination date but allows for termination after 60 years, so in 2024, with a 10-year notice.⁷ Both countries decided not to activate this option but to modernize the Treaty as it was seen to not address certain environmental issues and to lack flexibility. The US position also seems to indicate that the current compensation mechanism is more favourable to Canada than to the US and that it would like to rebalance it.⁸ There are also open questions about how flood risk management is compensated after 2024 for as the Treaty provisions relating to this issue are coming to an end in September 2024 and a new regime entering into force unless the negotiations are completed before.⁹

Therefore, the US and Canada have been negotiating since 2018 to update the Treaty in order balance power production, flood control and ecosystems functions. The negotiations are still ongoing with the 19th round took place in October 2023. Their current status is unclear but they do not appear to have concluded at the time of writing this report.

3.1.3. The Treaty

The Treaty consists of a main instrument with 21 articles, two annexes¹⁰ and a protocol containing an exchange of notes between the US and Canada relating to a number of aspects of the Treaty as well as a Canadian Entitlement Purchase Agreement that was in place until 2003 and pursuant to which Canada sold its share of the hydropower production to US energy entities. A number of supplementary agreements were entered into on specific issues on operational and environmental issues.¹¹

⁴ British Columbia, Columbia River Treaty, the Treaty (@ <https://engage.gov.bc.ca/columbiarivertreaty/the-treaty/>)

⁵ For a more detailed overview of the Treaty, see the "In Depth Case Study of the Columbia River Basin" @ https://unece.org/fileadmin/DAM/env/documents/2014/WAT/05May_22-23_Geneva/case_studies/4.4.R.Paisley_ColumbiaRiver_case_study.pdf).

⁶ Ibid.

⁷ Some of the provisions of the flood control provisions in the Treaty expire in 2024.

⁸ See the remarks by US Negotiator Jill Smail at a virtual public session on 19 April 2023 (@ <https://www.state.gov/wp-content/uploads/2023/04/20230418-April-19-CRT-Negotiator-Jill-Smail-remarks-Accessible.pdf>).

⁹ See the remarks by US Negotiator Jill Smail at a town hall on 6 September 2018 (@ [\).](https://2017-2021.state.gov/chief-negotiator-jill-smails-remarks-at-the-second-columbia-river-treaty-town-hall/?_gl=1*1bo676y*_qcl_au*MzI3MjYyOTY1LjE3MDg5NDQ4NDg.)

¹⁰ Annex A: Principles of operation; Annex B: Determination of downstream power benefits.

¹¹ See in the In Depth Case Study (footnote 7), p.25.

Treaty element	Content	Article
Scope	The geographical scope of the agreement is the Columbia River Basin and the purpose of the Treaty is to cooperate to 1) generate hydropower and 2) control floods.	Preamble
Substantive rules	Canada provides storage on the Canadian side of the basin to improve river flow and constructs three dams in specified locations.	II
	Canada receives compensation for flood control in the form of: <ul style="list-style-type: none"> • half of the hydropower produced in the US • monetary payment 	IV (4) V + VII + Annex B VI
	The US maintains and operates effectively hydroelectric facilities on the main stem of the river on US territory and provides standby transmission service.	III + X
	The US may construct a dam on a particular tributary (Kootenai).	XII
	Diversions are not allowed unless agreed or after 60 years (in 2024) for the headwaters.	XIII
Procedural rules	The Canadian dams are operated according to Annex A and agreed operation plans until 2024.	IV (1) and (2)
Institutional mechanisms	Canada and the US each designate an entity with powers and duties to implement the Treaty. For Canada it is the Hydro and Power Authority (BC Hydro) and in the US it is the Administrator of the Bonneville Power Administration and the NorthWestern Division Engineer of the US Army Corps of Engineers.	XIV
	A joint institution, the Permanent Engineering Board, ¹² is established with powers and duties.	XV
Dispute settlement	Disputes not settled by negotiations are referred to the International Joint Commission; if unsuccessful arbitration is possible.	XVI

3.1.4. The compensation mechanism

This section considers the following elements of the mechanism: its basis, any conditions attached to it, and the mechanism components.

Basis

The basis for the compensation is that Canada is storing water to facilitate flow control and mitigate floods, which limits its own hydropower production capacity. The surface area and location of these reservoir dams is defined.¹³ Canada accepted and constructed them.

Compensation is provided for by the US being the downstream beneficiary of the upstream infrastructure in Canada. This allows the US to maintain and operate hydropower facilities

¹² See its website @ <https://www.nwd.usace.army.mil/CRWM/PEB/>.

¹³ Art. II(2).

using the improved flow as effectively as possible.¹⁴ Annex B of the Treaty details how these downstream power benefits are determined.

Overall, the benefits of the Treaty are considered to be: flood control; new power generation; increased efficiency in power generation already in place; sharing of downstream benefits between the two countries; and increased integration and coordination of water management.¹⁵

Losses were also identified: increased negative impact on fish and on wildlife; wetlands losses; population displacement; productive land and wetlands flooded; marginalisation of local communities and Indigenous peoples.¹⁶

Conditions

The conditions attached to Canadian storage are mentioned at Annex A, which describes the 'Principles of Operation'. This includes general terms and procedures and specific ones for flood control and power generation.

The general terms mention:¹⁷ establishing and operating a hydrometeorological system and sharing the data; ensuring sufficient discharge capacity to regulate power and flood control as wanted and agreed by the countries; and specific weekly outflows for each dam.

The specific provisions about flood control operation¹⁸ state that Canada will operate the dam in accordance with operating plans provided by the US, which may be adjusted by agreement if necessary. These assured operating plans determine flood control and power generation, as well as the Canadian power benefits, and are developed five years in advance.¹⁹ The actual operations are determined using annual detailed operating plans,²⁰ which are then adjusted monthly and weekly.

The power production objective²¹ is 'optimum power generation' established in operating plans aligned with 'any agreed electrical coordination between the two countries'.²²

Reductions in storage in Canada affecting downstream US power production are limited to specific volumes. If electricity is produced in one country only, to achieve optimum power generation as agreed by both parties, then the other is compensated in power.²³

Those benefits, computed in three steps,²⁴ represent:²⁵

¹⁴ Art. III(1).

¹⁵ In Depth Case study (footnote 7) above, p, 16.

¹⁶ Ibid.

¹⁷ Annex A, paras. 1-4.

¹⁸ Annex A, para. 5.

¹⁹ Article XIV(2)(h); Annex A, para 9; and Annex B, paras 5 and 6.

²⁰ Article XIV(2)(k).

²¹ Annex A, paras. 6-9.

²² Annex A, para 7.

²³ Annex A, para. 8.

²⁴ Annex B, para. 7.

²⁵ Annex B, para 3.

- the estimated increase in dependable hydroelectricity capacity²⁶ in kilowatt for agreed periods of critical stream flow;²⁷ and
- the increase in average annual usable hydroelectric energy output in kilowatt hours²⁸ on the basis of an agreed period of stream flow record.

The Treaty mentions the option for the US to build a dam on the Kootenai river, one of the Columbia tributaries, with part of the reservoir located on Canadian territory and benefits from the dam to enjoyed where they occur.²⁹ The Libby dam was completed in 1972.

Diversions that affect the flow of water crossing from Canada to the US within the basin are not allowed except if agreed by the countries or in certain limited circumstances.³⁰

Nevertheless, from 2024 Canada is authorized to divert water that would otherwise flow to the Kootenai river provided its flow is not reduced.

Mechanism components

The compensation mechanism has two main components: *electricity* and *monetary compensation*.

- Provision of electricity by the US to Canada

Canada receives half of the electricity produced in the US, in other words the downstream power benefits.³¹ This electricity is calculated in advance and represents the difference between the electricity that can be produced in the US with or without using the Canadian storage.³² It is delivered to Canada in two ways: as dependable hydroelectricity capacity scheduled by the Canadian entity and as average annual usable hydroelectric delivered in equal amounts monthly (unless the parties agree something else).³³

The Treaty offers other options: the power Canada is entitled to can be used in the US and dependable and average hydroelectricity can be exchanged.³⁴

- Payment of monetary compensation by the US to Canada

The Treaty mentions three types of compensation:³⁵

- 1) a one-off payment of US\$64 million for the flood control provided by Canada through the three storage facilities in Canada;³⁶

²⁶ Annex B, para 2.

²⁷ Annex B, para 6.

²⁸ Annex B, para 3.

²⁹ Art. XII.

³⁰ Art. XIII.

³¹ Art. V.

³² Art. VII (1) and Annex B.

³³ Art. VII (3) and (4).

³⁴ Art. VIII.

³⁵ Art. VI.

³⁶ This represents one half of the value of flood damage reduction service provided by the reservoirs protecting US land downstream for a 60-year period (Yu, W. (2008) Benefit Sharing in International Rivers: Findings from the Senegal River Basin, the Columbia River Basin and the Lesotho Highlands Water Project), Report no. 46456, The World Bank, p.35).

- 2) payments for any specific requests for storage for flood control as well as the supply of power equivalent to the power not generated by Canada during that period because of storage operation for a maximum of four flood periods;³⁷ no such request was made since the entry into force of the Treaty;
- 3) for requests for storage for flood control after 2024 payment of operating costs and economic loss compensation for renouncing other uses for the stored water.

This last point is one of the issues currently being discussed in the negotiations. What the compensation for economic loss represents is not indicated in the Treaty.

3.1.5. Execution by authorized power structures

To implement the Treaty, each country appoints a 'designated entity' (or more) responsible for the operational implementation of the Treaty.³⁸

Canada designated the British Columbia Hydro and Power Authority (BC Hydro).³⁹ The US appointed the Administrator of the Bonneville Power Administration and the NorthWestern Division Engineer of the US Army Corps of Engineers.⁴⁰

The duties and powers of these entities, which the countries may change, are mentioned throughout the Treaty⁴¹ and include amongst others: planning coordination and information exchange regarding power production; calculating and arranging delivery of power to Canada; calculating the monetary compensation paid by the US; consulting each other about variations; supporting the joint institution (the Permanent Engineering Board); operating the hydrometeorological system of Annex A; and preparing hydroelectric and flood control operating plans for Canadian storage.

These entities have a fundamental role to play in all major aspects of the practical implementation of the Treaty and particularly the application of the compensation mechanism. The focus is on their role regarding the Treaty itself. There are no indications of their domestic role, which is left to national regulations.

3.1.6. Specific comments

Economic aspects

The focus of the Treaty is on the practical aspects of the cooperation and makes two limited references to economic aspects. There is a general reference in the preamble to the potential of the Columbia River to contribute to economic growth and strength in both countries and to their intention to develop the water resources to achieve economic progress. The main direct reference seems to be Art. VI(4)(b) with its compensation for economic loss to Canada if it stores water rather than using it from other possible uses.

Water commoditization

³⁷ The agreed amount for those first four flood periods was \$1.875 million.

³⁸ Art. XIV.

³⁹ Canada – B.C. Agreement of 8 July 1963 included in the Protocol attached to the Treaty.

⁴⁰ Executive Order N.11177 of 16 September 1964 included in the Protocol attached to the Treaty.

⁴¹ See Art. IV, V, VII, VIII, X, XI, XIV and XV.

Water quantity plays a role in water storage principally and not as the subject of exchange between the two countries. There are some volumetric requirements⁴² indicated but there is no monetary value attached to the resource itself. Rather it seems to be the service of storing water that is compensated, and in future the economic loss for the country storing as mentioned above. This particular loss has not been defined and is currently subject to the negotiations happening between the US and Canada.

Withdrawal limitations

The main objective of the agreement is the storage of water in Canada for flood protection and power production in the US. Withdrawals and diversions are not authorized if they affect the flow of water crossing the international boundary except if the countries agree to it or in the case of the Kootenay River as described in Art. XIII.

⁴² See for example Art. XIII(4).

Proportionality allocation

The main focus of the Treaty is not on water allocation but on achieving the 'most effective use' of improved stream flow resulting from Canadian storage for power production.⁴³ Therefore, it does not contain any references to allocation nor to scarcity issues.

3.1.7. Analysis

General comments

Starting with the nature of the Treaty itself, it is a bilateral agreement concerning a specific watercourse, the Columbia River, regarding a specific project with two objectives (hydropower and flood control) signed in 1964. As already mentioned, it is being renegotiated by the two countries. After almost 60 years of practice implementing it, a number of points not addressed in it but relevant today were noted. Scholars have identified the following: increased societal awareness of the importance of the environment; need for empowering the local communities dependent on the river; increased energy demand; fish populations; and climate change.⁴⁴ One of the reported objectives of the Canadian negotiating team is to have greater flexibility of water flow in Canada and incorporating ecological considerations for the river and to also address climate change. On the US side a central issue is the value of the downstream power benefits Canada is paid, the cost it represents for the US and the fairness of it. The share of hydropower production allocated to the US decreased over time as a result of the adoption of environmental legislation to protect fisheries. This impacted the US ability to allocate flow for energy production and thus decreased the US share to less than half. This situation was not envisaged under the Treaty and changes to that allocation could not be made.⁴⁵

This highlights that the situation can vary over time and that there is a need for some form of flexible mechanism to be incorporated in an agreement so that changes can be incorporated more easily even if formal negotiations always allow for changes to an agreement.

Another important point of the Treaty is its content. It has been drafted as if it was a commercial or project agreement filled with numerous details regarding operations, finance and so forth rather than an international agreement setting out how two countries intend to regulate the international relations. For example, it includes specific details about the amount of compensation. In such a case it could help to have regular review mechanisms to ensure the suitability of the agreed compensation, which was agreed for a period of 60 years. As mentioned, this is one of the issues now raised by the US that provides hydropower electricity to Canada. The challenge of such a mechanism is that it remains fair for all parties and is not used against one of them.

The language adopted in the Treaty presents challenges. It is complex and heavy and therefore not easily understandable when first read. Language used should be carefully

⁴³ Art. III(1).

⁴⁴ B. Cosens, 'Transboundary River Governance in the Face of Uncertainty: Resilience Theory and the Columbia River Treaty', (2010) 30 J Land Resources & Envtl Law, 229.

⁴⁵ In Depth Case Study (footnote 7), p.18.

considered so that it is understandable to as many as possible, particularly to those that have not been involved in the negotiations.

As regards the complex compensation mechanism, it represents what seemed fair and equitable to the two countries at the time the Treaty was concluded. However, it is disputed by the US today, which is the country providing the compensation. One point that is changing in 2024 according to the Treaty is the terms of flood storage by Canada, which will be on an ad hoc basis so when necessary for flood risk management. The challenge for the US is paying for the economic loss sustained by Canada because of that storage and one of its negotiation objectives is to reduce its reliance on it. This highlights the delicate nature of compensation, particularly financial compensation by one party to another, and the need to design a mechanism that does not antagonise them. The dynamic nature of water management and water and energy demand must also be taken into account given their variability.

Specific comments

Starting with advantages, the Treaty presents a clear example of a compensation (or economic) mechanism and therefore demonstrates that such mechanisms have been adopted elsewhere with some success. It can thus be seen as a precedent or an international practice that Kyrgyzstan can point to in support of its intention to establish a compensation, or economic, mechanism.

The Treaty defines what the 'downstream benefits' are. This notion could also be adopted to identify more specifically what the benefits to Kyrgyzstan's downstream neighbours are, as a basis for determining the mechanism to be put in place. A first step could be to proceed with that identification based on the need water needs of those countries. The main one is the storage of water during winter and its release at an appropriate timing and others could be added, also in discussions with those riparian countries, to set out the full extent of the benefits.

The structure of the exchange is also interesting. This case study highlights that it is based on Canada providing a service to the US by storing water upstream to avoid or mitigate floods and ensuring improved water flow of water that enhances hydropower production in the US. In return for the service of flood control, the US paid Canada upfront in the amount of US\$64 million with additional payments in case of requests for extra storage at specific times,⁴⁶ to cover hydroelectric power production loss in Canada. This shows how a mechanism could be structured: with an agreed baseline at a certain price and requests beyond this baseline requiring additional payments. This could address the fact that there is variability of water availability and that more water is needed specific requests could be made.

Another similarity that points to an international precedent is the element of loss of usage for the water being stored. In Canada the water cannot be used for hydropower production and is thus experiencing a loss similar to the one in Kyrgyzstan as the water stored in Toktogul is

⁴⁶ This is in case of high inflows.

also not used for hydropower production. The difference here is the usage of water in the downstream country because in the US the water is used for hydropower production so there is a direct link there that does not exist in the case of Kyrgyzstan because its downstream neighbours are using the water for agricultural purposes. However, in the case of Canada, the loss is not quantified per se as one amount was paid upfront for a period of 60 years as opposed to representing a yearly financial loss caused by the cost of electricity imports from neighbouring countries. Thus, a specific method of quantification must be developed for the situation of Kyrgyzstan.

The planning element is also to be noted. As mentioned above, an operational plan is developed by the US on a five yearly basis, in advance, with adjustments made on a yearly, monthly and weekly basis based on actual operation. The notion of preparing a plan in advance could be emulated with the idea that this could serve as a basis for upfront monetary or in-kind compensation that could be adjusted later based on actual operation. The challenge would be to persuade downstream countries of the benefit of proceeding this way because of the cost it would represent for them though the first payment or in-kind transfer could be interpreted as levelling the situation towards Kyrgyzstan for its past services. The details would need to be carefully considered but proceeding in this way could facilitate compliance.

The Treaty is also useful in highlighting the issue of the timespan of an agreement and how parties look into the future regarding different issues. As already mentioned, it is being renegotiated for a number of reasons. Some relate to the representation of the populations living in the basin, on both sides of the border, and their inability at the time to be part of the decision-making process that led to the Treaty despite being affected negatively by it. There are also environmental concerns about ecosystem health in the basin and in particular around fisheries. Climate change impacts on flooding are also a consideration in the operation of the Canadian reservoirs and flood risk management in the US. Assured water supply is another related point, which is important to emphasize. The point here is to have the awareness that situations and issues may evolve over time and require revisiting. In the case of Canada and the US some supplemental agreements were entered into to deal with specific issues and today the two countries are renegotiating the Treaty.

Finally, and importantly, the US does not consider the economic arrangement decided over 60 years ago and operated since to be equitable. It wishes to create a new balance in the sharing of the power produced downstream (half of which goes to Canada). It now proposes 'a measure of the power value of coordinated operations as compared to non-coordinated operations'⁴⁷ that it considers to be fairer because currently the value of the Canadian share of the power exceeds the value of coordinated power operations as provided in the Treaty. In some ways, the situation in which the US, the downstream country, finds itself is similar to Kyrgyzstan that is also considering that the current arrangement is not fair and equitable as it could be because it has to bear the cost of the electricity it must purchase because it cannot

⁴⁷ See the U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2024, 13 December 2013.

operate the Toktogul dam to produce electricity. The issue of fairness and equity is therefore one that is called upon even by countries like the US.

However, the new terms that the US and Canada have been negotiating for 6 years now are not public so we do not know what the two countries are considering for the compensation and how the mechanism will operate. For now, the Treaty indicates that Canada would receive from the US the operating costs to provide the flood control and compensation for the economic loss, which could also be provided in power. The way in which this is to be calculated is one of the points the US wants to address in its negotiations.⁴⁸ It is therefore not possible to draw lessons from this case study about the calculation of economic losses. Nevertheless, it sets for now the precedent for using the concept as a basis for an economic mechanism and for considering the provision of electricity as compensation for the flood control service provided by Canada.

Turning now to the less advantageous aspects of the Treaty, the first one is that it will not remain as it is because it is being renegotiated so references to it must be made cautiously. Aside from this point, other elements that can be used to illustrate its weaker elements are the fact that it was focused on very specific objectives that must now be expanded to integrate, amongst other things, environmental issues, and the lack of in-built flexibility, as noted both by the US and Canada to better deal with different types of variabilities. Thus, the scope of any future agreement agreed by Kyrgyzstan must be carefully considered to ensure it captures the necessary objectives and anticipates that there may be a need to make some adjustments at a later stage.

As mentioned above, the Treaty was conceived as a contract with detailed terms for construction and operational purposes in a very technical and heavy language. This makes it challenging to understand the mechanism in place for those not familiar with the terminology used. This may be a disadvantage and so one should ensure that the text can be understood by a broader audience that is also involved in its implementation otherwise this may lead to more challenges because the terms may be misunderstood and misinterpreted. Aside from terminology, it also raises the issue of the nature of an agreement and its content. Should it be more of a framework that sets out general objectives between the parties, with more specific details set out in a protocol or a separate agreement for example or should it in fact contain more details about the way in which compensation is calculated so that this is entrenched and cannot be changed too easily? This really depends on what elements need to be stable and what need flexibility, such as pricing changes that might affect the calculation of the compensation.

The Treaty was also designed for infrastructure that was not yet constructed unlike the situation here, where the infrastructure is already in place and operational. Therefore, unless new infrastructure is considered the provisions that deal with this are less relevant here though they may serve as an example should this be something to consider in the future.

⁴⁸ Ibid.

Overall, this Treaty offers a number of very relevant points despite the differences with the situation in Kyrgyzstan explained above.

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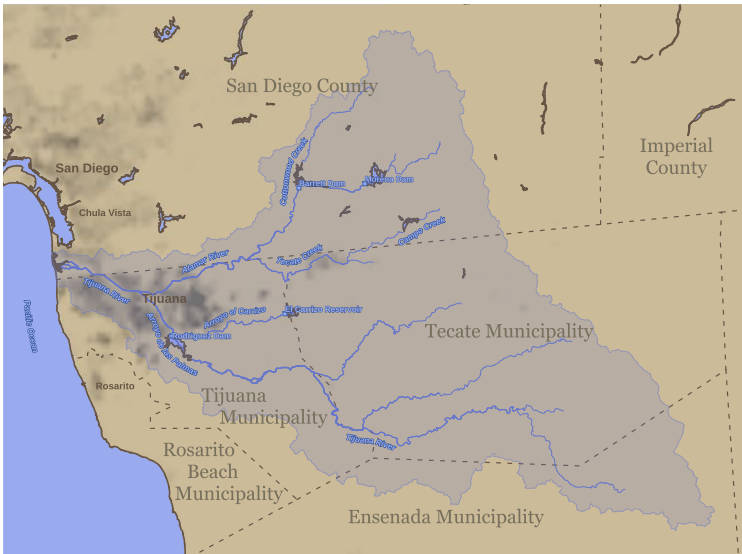
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Source: Wikipedia⁵⁰

2.2.2 Treaty background and status

The ‘Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande – Treaty between the United States of America and Mexico’ (Treaty) was signed in 1944. Earlier treaties⁵¹ were agreed between the two countries including one in 1889⁵² that established a joint institution that is perpetuated under the Treaty with an adjusted name: it is now known at the ‘International Border and Water Commission’ (IBWC).

The Treaty is currently in force. A number of adjustments have been made to it through the use of the ‘minutes’ mechanism.⁵³ It is not being renegotiated but its implementation has been challenging as referred to in the analysis section below.

2.2.3 The Treaty

The Treaty is composed of main instrument with 28 articles and a protocol. So far, the IBWC has adopted 329 minutes.

Treaty element	Content	Article
Scope	Rights of both countries regarding the Colorado, Rio Grande and Tijuana for their complete and satisfactory utilisation	Preamble
Substantive rules	Priority rules for joint use of international waters	3
Specific rules are set out for each river	Rio Grande	4-9
	Colorado	10-15
	Tijuana ⁵⁴	16

⁵⁰ https://en.m.wikipedia.org/wiki/File:Tijuana_River_Basin.svg.

⁵¹ There is also a 1906 Treaty that concerns the northwest portion of the Rio Grande basin according to which the US must deliver 74m m³ to Mexico annually (with reductions in case of drought).

⁵² Convention between the United States and Mexico, Water Boundary, Treaty Series No.241, 1889.

⁵³ This is a mechanism that allows the IBWC to make decisions about the implementation of the Treaty, subject to the approval of the respective governments (Art. 25).

⁵⁴ Article 16 is the only article that deals with the Tijuana. It does not refer to any compensation mechanism. Instead, the IBWC makes recommendations on its equitable distribution between the two countries and recommendations in other areas such as proposals for storage and flood control with any works to be paid equally by both countries.

Treaty element	Content	Article
	General provisions (including concluding separate agreements to regulate hydropower production and export)	17-23 (19)
Procedural rules	IBWC minutes mechanism	25
Institutional mechanism	IBWC duties and powers	2, 24-25
Dispute settlement	IBWC 1 st step to settle disputes; if unsuccessful, the governments negotiate directly	24(B)

2.2.4 The compensation mechanism

There are separate mechanisms for the Rio Grande and for the Colorado. They are considered separately below.

Rio Grande

The main focus of the Treaty regarding this river is the allocation of its waters and their distribution for both countries. It also covers regulating and conserving the waters for usage by way of storage dams and reservoirs jointly constructed and operated, and hydropower production. As regards distribution, over an allocation period of five years during, Mexico must deliver to the US in the main channel of the Rio Grande⁵⁵ one third of the flow of the river at a minimum of 350k acre-feet or 431,721m³.⁵⁶ The water does not need to be delivered annually but the full amount agreed must be delivered by the end of the allocation period.

The main in-kind compensation mechanism in the Rio Grande relates to water quantity in its main channel and water delivery by Mexico to the US so it is not an economic mechanism but a mechanism that allows for adjusting to the quantity delivered to the US in certain circumstances. Indeed, it operates only in the event of an extraordinary drought or of a 'serious accident' at a hydraulic system on a Mexican tributary preventing Mexico from providing the agreed minimum amount over a period of five years. In that case, Mexico must compensate the US with the missing volume over the following five years. Compensation is completed when two international reservoirs with water belonging to the US are filled with the missing volume so that gap in the five-year cycle is filled and the normal situation is restored.⁵⁷ Mexico can repay its water debt in three ways over the next five years: delivering sufficient water from tributaries to satisfy the debt; transferring stored water to the US; or if enough precipitation fills the storage capacity of both countries. Mexico retains the right to satisfy basic urban water needs of its downstream municipalities.⁵⁸

Minute 234, adopted in 1969, addresses the issue of how to deal with a 'second cycle' debt. This is the situation when at the end of the five-year period during which Mexico must repay its water debt there is still missing water that Mexico must repay. In this case, Mexico must

⁵⁵ From the tributary rivers Conchos, San Diego, San Rodrigo, Escondido and Salado, and the Las Vacas Arroyas (Art. 4(B)(c)).

⁵⁶ Art. 4(B)(c)).

⁵⁷ Art. 4 (B)(d)).

⁵⁸ Art. 9.

provide additional water to avoid another deficiency. The matter of water deficiencies has been an ongoing issue and a number of minutes have been agreed to address it. This is developed further in the analysis section below.

A second related compensation mechanism relates to the operation of the joint storage dams.⁵⁹ If one country's capacity is full thanks to inflows from its source then any excess flow goes to the unfulfilled capacity of the other country. The unused portion can then be used temporarily by the other country for storage. Reports indicate that this mechanism has not been referred to or utilized in recent IBWC minutes.

The Treaty also provides for the construction of infrastructure for water storage and regulation, and diversion. As regards the costs for the storage dams, both countries contribute to the construction, operation and maintenance of the infrastructure in proportion to each country's allotted capacity in the dam.⁶⁰ Similar costs for the diversion infrastructure are divided pro-rata according to the related benefits each country enjoys. As for hydropower production, the costs for construction, operation and maintenance are to be shared proportionally by the countries as well as the energy generated.⁶¹ Costs is one of the matters that the IBWC considers and a number of minutes deal with them.⁶²

Colorado

Colorado's river situation is different from the Rio Grande: the main obligation is on upstream US to supply Mexico with 1.5m acre-feet of water annually⁶³ and additional volumes in the event of an available surplus.⁶⁴ In the event of an extraordinary drought or serious accident to a US irrigation scheme, the amount can be reduced in proportion to use reduction in the US.⁶⁵ Infrastructure supporting the distribution of water on both sides is paid for separately by each country with the involvement of the IBWC.⁶⁶

The financial compensation mechanism agreed by the two countries for the Colorado can be summarised as follows. First, Mexico pays to the US a proportion of the cost for the construction of some of the dams in the US that distribute the water, based on the proportionate use of the facilities, as agreed by the countries.⁶⁷ Mexico then contributes a proportion of the maintenance and operation costs of the same facilities based on the water delivered.⁶⁸ Any amortization of the cost thanks to revenue from hydro-power production at one of the US dams (Pilot Knob) reduces the amount to be paid by Mexico.⁶⁹

A new mechanism was introduced in Minutes 323 and 319. Mexico can store water in Lake Mead in the US and delay US distribution to it. This increases the lake elevation, which is

⁵⁹ Art. 8(c).

⁶⁰ Art. 5 II.

⁶¹ Art. 7.

⁶² For access to all the minutes see <https://www.ibwc.gov/minutes/>.

⁶³ Art. 10(a). The volume represents approximately 1,8 billion m³. The specific volumetric and geographical apportionment is described in Art. 11 and its timing at Art. 15.

⁶⁴ Art. 10(b) with a limit at 200k acre-feet, just over 2m³.

⁶⁵ Art. 10(b).

⁶⁶ Art. 12(d), Art. 13.

⁶⁷ Art. 14(a).

⁶⁸ Art. 14(b).

⁶⁹ Art. 14(b).

beneficial for both countries and for the environment. Environmental flows have also been acknowledged and restored for environmental purposes. The US has financed this in exchange for water stored at Lake Mead.

2.2.5 Execution by authorized power structures

The Treaty does not deal with power production, even if it is mentioned, so there are no authorized power structures. The institutional set-up described here does not, therefore, address any such issues.

The IBWC is the joint body set up by the countries with a number of powers and duties listed throughout the Treaty. Some powers are reserved for the governments of each country in which case it is the US Department of State and the Mexican Ministry of Foreign Affairs that are the entities involved. Other powers and duties have been assigned to the IBWC under separate agreements between the two countries.

Work to be undertaken within each country is dealt with by the national section of the IBWC, unless with the consent of the other government, which retains control over that work.⁷⁰

2.2.6 Specific comments

Comments in this section apply to the Treaty generally or if necessary, make specific reference to the river being commented upon.

⁷⁰ P.7.

Economic aspects

The Preamble of the Treaty makes a general reference to achieving the 'most complete and satisfactory utilization' of the three rivers. There are no statements regarding economic gains or mutual benefits.

Practically, three quarter of the water is used for agricultural production on both sides of the border. The other uses are: energy production, industry, fracking and human consumption. There are therefore significant economic interests attached to water consumption on both sides of the border.

The price of water paid in each country has been commented upon as one of the elements contributing to water use and overall, to the consumption challenges on both sides of the border, which is not an issue addressed in the Treaty. Underlying this issue is also the enforcement of domestic regulations and reliable, and effective, penalties where necessary. This is one example of how domestic matters are connected to the fulfilment of international obligations, particularly those related to volumetric allocations.

Water commoditization

There is no water commoditization: no monetary value is attached to the water of either of the rivers. The connection is through storage so payment is for the service of the use of facilities for that purpose.

Withdrawal limitations

No withdrawal limitations are explicitly mentioned. Limitations are implicit in the volumes guaranteed to each country. Domestic withdrawals must be limited in order for the volumes to be delivered downstream. The Baker Institute highlights the need for what is calls non-treaty mechanisms to address water availability to manage both supply and demand on both sides of the border.⁷¹

Proportionality allocation

The allocation provisions for each river are expressed in flow proportions with a minimum fixed allocation indicated. For example, the Rio Grande is allocated through different geographical sections with the flow in each section divided into 1/3 or 2/3. The main channel of the Rio Grande is an exception: this is where a specific volume is attached to the 1/3 flow to be received by the US as described above in the compensation mechanism.

This Treaty has the following allocation prioritization guidance list to be used if a prioritization is required: domestic and municipal use; agriculture; electricity; other industrial uses; navigation; fishing and hunting; and anything else the IBWC selects.⁷²

Scarcity is implicitly acknowledged through the reference to extraordinary droughts that permit Mexico and the US as explained above. However, this is a temporary mechanism to alleviate what is considered a temporary issue, which has created challenges to fulfil when the droughts have lasted longer than expected.

⁷¹ Mumme S and O. Ibanez, 'Treaty and non-treaty mechanisms for resolving the Rio Grande River water debt dilemma'. Baker Institute for Public Policy, 12 December 2022.

⁷² Art. III.

2.2.7 Analysis

General comments

The Treaty is a bilateral agreement between the US and Mexico that deals with all their transboundary rivers. Its main focus is a volumetric allocation on the two largest rivers with obligations on both countries. It is another example of an agreement intended to be comprehensive that contains very detailed provisions. For example, Article 2 refers to practical issues such as IBWC staffing and so forth. This raises the question of how the content of agreements with a long-term outlook should be considered. The Treaty has no termination date but is designed to stay in place until replaced.⁷³ To facilitate adapting to new circumstances, it contains the 'minute' mechanism that allows the IBWC to adopt decisions subject to the approval of the respective governments. As stated, there have been 329 so far. The minutes do not amend the Treaty but supplement it and allow for clarifications as in the case of the second drought cycle mentioned above. This is an example of a type of flexibility mechanism that has served to adjust to new situations or to clarify certain points.

As regards the Treaty, this can be seen in the context of the compensation mechanism. The Rio Grande mechanism was conceived with the notion that there could be variability in water availability in the future. However, experience showed that the mechanism did not necessarily operate successfully and that the issue had to be considered again. This led to the adoption of minutes allowing for new measures to be taken. Nevertheless, it appears that the parties did not envisage that a severe and prolonged drought could occur after the second cycle, which is what is now being experienced in the Rio Grande basin. This has caused tension within and between the two countries and has been creating water stress in the basins and having an ecological impact. Minutes have been adopted to deal with this situation. In fact, Minute 325 requires the two countries to conclude negotiations in December 2023 to deal with current water deficits.

A notable point is the impact of external elements. There is climate change that is affecting precipitation upstream and reducing downstream flows thus affecting the ability of the parties to comply with their volumetric allocations. The notion of extraordinary drought mentioned in the Treaty has not yet been clarified in minutes though recommendations have been made by the IBCW to improve efficiency, data sharing and use advisory teams.

Indeed, in light of these and of growing domestic pressure with agricultural and urban growth, the IBCW has recommended non-treaty domestic mechanisms such as water conservation, domestic usage measures (and governance) to enhance each country's ability to meet its volumetric obligations. Each country has adopted a different approach with the US allocating first water to Mexico and then to its domestic users. Mexico proceeds first with internal allocation and then to the US and has consequently been running a substantial water debt for many years.

The Colorado is also facing many issues: climate change is impacting water availability including in the Hoover dam reservoir and there is no longer sufficient water to fully satisfy

⁷³ Art. 28.

demand for all the US based water users. There has also been growing water use in the US and prioritisation must be done according to complex state laws. This highlights the importance of the national context on international obligations and the need to ensure both are clearly aligned.

Finally, the important and broad role of the IBWC should be mentioned. The institution has been in place for over a century and therefore has substantial experience working on the different basins. It has also adopted hundreds of minutes. Few other institutions have been active for so long but it seems the two countries have been able to establish the right conditions for the IBCW to play an effective role. It should also be noted that as regards the Colorado River, bilateral engagement has also taken place in other formal settings that has brought together different stakeholders on both sides of the border on a variety of issues, in a manner that was seen to build trust, address disputed issues and improve overall collaboration.⁷⁴

Specific comments

Beginning with the positively relevant aspects of this Treaty, it is interesting to note that there is an economic mechanism in place for the Colorado regarding the construction and use of infrastructure for storing and distributing the waters of the river. This is a second example of that practice, which demonstrates again that countries have agreed on a form of economic mechanism for a service provided in relation to water though the link is different than in the case of the Columbia River since the main focus of the Treaty is water distribution. Indeed, power production and energy issues do not feature as prominently in this Treaty. Nevertheless, this confirms the practice of providing a storage service for which costs are covered by the country benefitting from the service. These costs included construction costs as well as operation and maintenance ones.

Another positive element is the flexibility mechanism that the US and Mexico have been using to address via their joint institution the IBWC new issues, namely the 'minute' mechanism. In this way, it is able to identify and propose concrete solutions subject to the approval of each country. For example, the increased use of groundwater on both sides of the border had not been anticipated but has grown and was introduced as a topic of governance through a minute. This is a rare example of a built-in flexible mechanism that facilitates addressing unexpected issues though it should be noted that the institution that has been given this power has been in place for over a century as this institutionalised cooperation had been established decades before the Treaty was entered into. The two countries therefore had a history of bilateral relationship on border-related issues, which may have facilitated agreeing on this mechanism.

The Treaty also acknowledges and addresses variations in water availability with its five-year cycle against which the Mexican contribution to the Rio Grande is assessed. Its implementation is challenging, as explained, but it is a starting point for considering how to

⁷⁴ Rivera-Torres, M., Gerlak, A.K. Evolving together: transboundary water governance in the Colorado River Basin. *Int Environ Agreements* 21, 553–574 (2021).

acknowledge and address the likely variations in water availability in the Syr Daria basin. Although the situation of the Rio Grande is not the same because the water used upstream is mainly for agricultural production rather than hydropower production, there are similarities with the requirement of water delivery downstream and the variations already happening and forecast to continue.

Another interesting point of the Treaty is that it contains a prioritisation clause that lists the order of priority for utilisation of the waters. According to Article III, first is domestic and municipal use, then agricultural and then hydropower. This is particularly relevant in case of resource scarcity that requires that kind of prioritisation, which is then clear and agreed by all the parties. The challenge will be that if there is less water available for non-domestic uses there may be limitations for the users of those categories, which becomes a domestic issue and downstream countries may be reluctant to address this. This is one of the problems that both the US and Mexico have been facing and the suggestions have been to consider water efficiency to measure to optimise water usage on each side of the border though this is not an obligation set in the Treaty.

Turning to the disadvantages of the Treaty, the first one to mention is that the situation here is different from the one between Kyrgyzstan and its neighbours since there is very little mention of electricity and its connection with water. This is principally an allocation agreement in which there is no room for economic losses experienced by the countries and there is no related economic mechanism. In that regard, it does not offer an example of an economic mechanism that could accommodate the present situation of Kyrgyzstan because of the lack of economic correlation with the water being allocated.

Finally, a key challenge that is being experienced at the moment is the ability of Mexico to comply with its allocation obligation to the US, which is fixed in the Treaty. There is growing demand for that water within Mexico and there have been droughts that have led Mexico to struggle to comply with that obligation and find itself in 'water debt' at least twice. Violent protests have also been a consequence of this because the Mexican authorities wanted to use water earmarked for agricultural use to pay off its water debt. One of the points to note, therefore, is the difficulty of setting a specific volumetric allocation in a Treaty despite the desire of downstream countries to have the assurance of how much water will be flowing into their territory and the impact on domestic water use. Of course, the minute mechanism described above allows for some flexibility but even that has not always been sufficient to prevent tension between the two countries. Another related point that has been mentioned is that the two countries could not agree on the meaning of term 'exceptional drought' that permits the delay for Mexico to fulfil its obligations. Thus, a discussion on what might constitute an exception to an allocation or to an agreed situation is important and necessary. More generally, possible future scenarios should be considered to determine what flexibility mechanism could be put in place to address variabilities that have already been anticipated.

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2.3 The Bulgaria and Turkey Water Agreement

3.3.1 Background

The Maritsa River flows for about 500km from Bulgaria to Turkey before marking the border for approximately 187km between Greece and Turkey and ending in the Aegean Sea. Two tributaries, the Arda and Tundzha (or Tundja), flow from Bulgaria and join the Maritsa on Turkish territory. The basin has a drainage area of approximately 50k km² with 66% in Bulgaria, 8% in Greece and 26% in Turkey.

The basin is heavily populated and the location of significant agricultural and industrial activities. Population size and agricultural activities are greater on the Turkish side; it is considered to have some of the most productive agricultural land in the country.

Issues affecting the basin include water quality due to industrial and mining activities in Bulgaria and agriculture and industry in Turkey and unsatisfactory domestic wastewater treatment. Rainfall patterns and snowmelt also cause substantial flooding, exacerbated by climate change and dam operation in Bulgaria.

Finally, reduced flow caused by Bulgarian dams is leading to salty seawater intrusion at the mouth of the river. Dam operation in Bulgaria has also been considered a cause of water shortages on the Turkish side.

Map of the Maritsa



Source: T. Isheav and P. Ivanov, Epilithic diatom flora from sub-Mediterranean intermittent rivers in Bulgaria during two hydrological periods, *Botanica Serbica*, 40(2) 2016, 154-160.

3.3.2 Treaty background and status

The subject of this section is the agreement between Turkey and Bulgaria regarding the purchase of water by Turkey from Bulgaria entitled 'Agreement on Assistance and

Cooperation in the Field of Water for Reducing the Negative Effects of the Drought of 1993' (Agreement).

Unfortunately, the text of the Agreement does not seem to be available. Multiple searches to locate it online were not successful and only resulted in second-hand references to it in scholarly articles. Therefore, the information about the content of this Agreement is limited. Additional relevant data about the legal relationship between the two countries regarding the Maritsa River is mentioned below.

Bulgaria and Turkey have entered into a few agreements regarding their shared water resources. Among them is the 1968 'Agreement concerning cooperation in the use of the water of rivers flowing through the territory of both countries'. The main objectives of this agreement are flood protection and water for irrigation needs. Other topics mentioned include key principles and information, data exchange and dispute settlement. It also indicates that specific measures for joint projects are to be arranged in separate agreements. There are no allocation or compensation mechanisms.

Another agreement was signed in 1974 for cooperation between companies of both countries in the field of economy which also included energy production and irrigation. A 1998 agreement on cooperation in the energy sector provided for the construction of a hydropower project by a Turkish company with part of the electricity produced to be purchased by Turkey. However, the project did not proceed further than planning because of the financial difficulties of a contractor and Turkey stopped purchasing power from Bulgaria in 2003.

In 2002 the Turkish-Bulgarian Joint Committee for Economic and Technical Cooperation agreed the 'Agreement on the Approval of the 15th Term Protocol' which included provisions regarding environmental cooperation for the protection of surface and groundwater resources. In 2012 the two countries issued a joint declaration about cooperation around water resources. They have also carried out joint projects on water quality and flood prevention with flood forecasting and analysis and an early warning alert system.

3.3.3 The treaty

This section contains the information about the Agreement derived from the second-hand sources located online.

Treaty element	Content	Article
Scope	Bilateral cooperation to reduce the negative effects of the 1993 drought	n/a
Substantive rules	Provision by Bulgaria of additional water from the Tundja river	n/a
	Payment by Turkey to Bulgaria at a price of US\$ 0.12 per m ³ of water	n/a
Procedural rules	n/a	n/a
Institutional mechanisms	n/a	n/a

Treaty element	Content	Article
Dispute settlement	n/a	n/a

3.3.4 The compensation mechanism

According to the information available, the mechanism appears to be a simple purchase of water at an agreed price.

Turkey purchased 15,866m cubic meters of water from Bulgaria, from the Tundja River, at a cost of US\$1,903,904⁷⁵ to 'maintain irrigated agricultural activities in Edirne'.⁷⁶ The same information indicates this was a one-off, but a later publication states that Turkey has been buying water from Bulgaria during periods of drought.⁷⁷

3.3.5 Execution by authorized power structures

From the information available about the Agreement, there is no reference to any power structures.

3.3.6 Specific comments

The limited information available limits comments on the four aspects considered in this section. The main economic aspect is the price paid by Turkey in 1993 of US\$ 0.12. It could be construed as a form of rare water commoditization. No withdrawal limitations seem to be included in the deal nor any proportional allocations. Water scarcity seems to have been the reason for the agreement in the first place but there is no information about whether this point is included in the agreement itself.

3.3.7 Analysis

General comments

Little seems known about the exact terms under which Turkey and Bulgaria agreed a sale of water in 1993 and whether this has been repeated over time. From a general perspective, and taking into account the relationship between the two countries regarding energy, the following comments may be made.

According to Burak and Pastarmadzhieva, there is close bilateral energy cooperation between the two countries, particular for natural gas. The same does not seem to apply to environmental issues including water, even if the authors expect the energy-related relations to have a positive impact on policies about shared environmental concerns.

The situation is very different when it comes to water resources. It is reported there is no basin-wide coordination that could contribute to solving the issues mentioned above particularly water quality and flooding. This is despite the 1968 Agreement that offers a basic

⁷⁵ A. Kibaroglu et al, Cooperation on Turkey's transboundary waters, Adelphi, 2005, p.33.

⁷⁶ H. Sakal and D. Pastarmadzhieva, Energy and Environment in Turkish-Bulgarian Relations, 8th International Scientific Conference "Social Changes in the Global World", 2021, p.354. The reference provided in the publication as the source for this information could not be found online.

⁷⁷ Ibid.

framework for cooperation between the two countries. As indicated above, Turkey and Bulgaria have entered into a number of agreements regarding water or infrastructure over the years but implementation does not appear to have been regular or extensive.

In this context, the agreement regarding the purchase of water appears to be an ad hoc event that was convenient at the time for both parties but did not have long-term impacts regarding the other issues mentioned above or even questions of allocation. What this case study demonstrates is that a limited number of countries have agreed to sell and purchase large volumes of water and that this is in fact a rare occurrence in a transboundary context.

Specific comments

There is limited relevance in this case to the situation of Kyrgyzstan because there is no electricity involved in the transaction; the subject matter of the deal was only water. In fact, water and energy seem quite separate in the bilateral interactions between Bulgaria and Turkey. Moreover, the purchase seems to have been for an exceptional circumstance and is therefore not an ongoing issue as is the case with the Syr Darya. It also seems to have been acceptable to Bulgaria for reasons that are not publicly available and it is not possible to know whether there was a local or national impact on water consumption as a result of the transfer of water. Finally, in the event of a prolonged drought one may wonder whether such a transaction could be possible if the effects of the drought affect all the riparian countries; Bulgaria may be reticent to part with water if it is also suffering from the consequences of the drought.

3.3.8 References

Burak Sakal, H., & Pastarmadzhieva, D. (2021). ENERGY AND ENVIRONMENT IN TURKISH-BULGARIAN RELATIONS. *Proceedings of the International Scientific Conference "Social Changes in the Global World"*, 2(8), 347-370. <https://doi.org/10.46763/SCGW212347s>

Isheav T. and P. Ivanov, Epilithic diatom flora from sub-Mediterranean intermittent rivers in Bulgaria during two hydrological periods, *Botanica Serbica*, 40(2)2016 154-160

Kibaroglu A., A. Klaphake, A. Kramer, W. Scheumann, A. Carius (2005) Cooperation on Turkey's transboundary waters, adelphi research

3.4 The Lesotho and South Africa Treaty on the Lesotho Highlands Water Project

3.4.1 Background

The Lesotho Highlands Water Project (Project) is the subject of the agreement reviewed in this section and concerns a large-scale water transfer from Lesotho to South Africa and hydropower production in Lesotho. The agreed volume to be transferred is 70m³ per second.⁷⁸

Lesotho is a land-locked country entirely encircled by South Africa with a population of just above 2 million people. Two-thirds of the country consists of mountains with high snow-capped peaks. South Africa's two largest rivers, the Tugela and Orange, have their source there with other rivers flowing within the country.

Water is therefore a key natural resource in this country with few other ones and economically heavily dependent on South Africa. With a population of over 61 million, a much larger surface area, many more natural resources and a significantly stronger economy, the situation of South Africa is different from its neighbour. However, it has substantial water needs.

The Project, which had been discussed decades before the agreement was signed, concerns transfer from the river Senqu River in the Lesotho highlands to the Vaal River in the Gauteng region in South Africa through a complex network of tunnels and dams. It provides water to the Johannesburg area, which is the country's economic hub and one of its most populated regions. The benefit for South Africa is increased water supply for a key economic (60% of the national economy) but water-stressed region. The benefit for Lesotho is to utilize the infrastructure and water flowing through it for hydropower production and benefit financially from the royalty payment described below for its socio-economic development. There is a 2021 R15,4 bn funding from commercial banks and the Development Bank of South Africa.⁷⁹

The Project infrastructure is being developed in two phases,⁸⁰ with the first phase sub-divided into two. Project IA, completed in 1999, included amongst others the Katse Dam and Muela Hydroelectric power plant and transfer, delivery and diversion tunnels. The construction of the Phase IB Mohale Dam, connection tunnels and other related infrastructure was finalized in 2003. Phase II was launched in 2014 and construction began in 2022. Full completion of the water delivery system and of the hydropower generation system is anticipated in 2027/2028.⁸¹ The additional storage capacity is expected to increase water supply incrementally from the current yearly 780m m³ to over 1.27bn m³ and to increase electricity generation capacity in Lesotho.

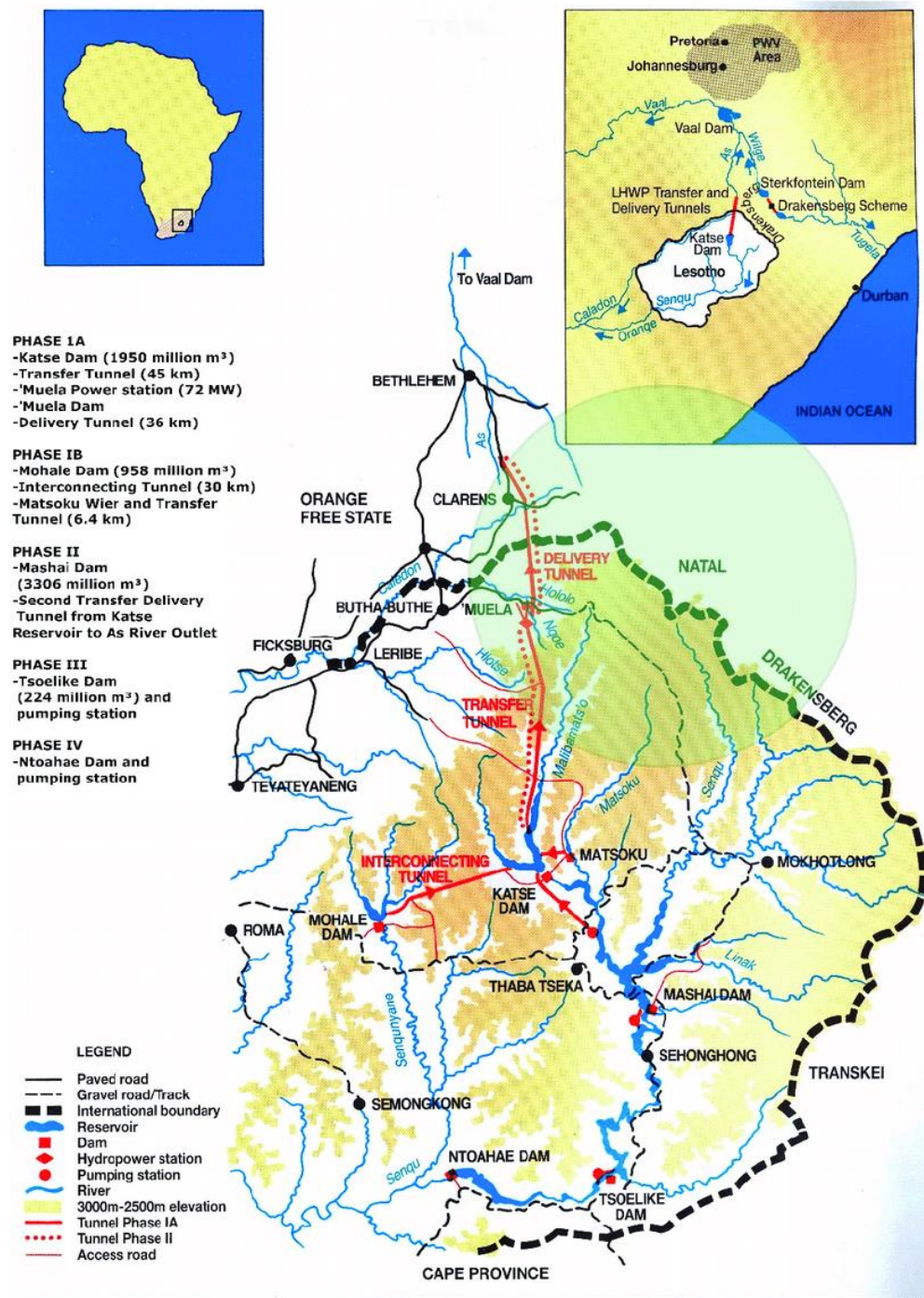
Map of the basin:

⁷⁸ Art. 5(1) Treaty.

⁷⁹ <https://www.tcta.co.za/case-study/lesotho-highlands-water-project/>.

⁸⁰ A Phase III is envisaged in Annexure I of the Treaty (Art. 6 and 7).

⁸¹ South African Government, 9 November 2022 'Water and Sanitation welcomes Phase II of the Lesotho Highlands Water Project'.



Source: Delves, J.L.; Clark, V.R.; Schneiderbauer, S.; Barker, N.P.; Szarzynski, J.; Tondini, S.; Vidal, J.d.D., Jr.; Membretti, A. Scrutinising Multidimensional Challenges in the Maloti-Drakensberg (Lesotho/South Africa). *Sustainability* 2021, 13, 8511.

3.4.2 Treaty background and status

The 'Treaty on the Lesotho Highlands Water Project between the Government of the Kingdom of Lesotho and the Government of the Republic of South Africa' was signed by the two countries in 1986 (Treaty). A sixth Protocol on governance issues was agreed in 1999 (Protocol). The 'Agreement on Phase II of the Lesotho Highlands Water Project between the

Government of the Kingdom of Lesotho and the Government of the Republic of South Africa' was signed in 2011 (Agreement).

These three legal instruments are currently in force.

3.4.3 The Treaty and Agreement

The Treaty contains 19 articles and 3 Annexes.⁸² It is the legal basis for the entire Project. The Treaty is particularly important because it contains the compensation mechanism⁸³ between the two countries. The Agreement makes no changes to that mechanism.

The Agreement contains 22 articles and 5 Annexes.⁸⁴ It is the legal basis for implementing Phase II of the Project and the operation and maintenance of both phases. The Treaty provisions remain valid unless the Agreement indicates differently. The Agreement indicates at Annexure V the minimum quantities of water for the calculation of royalties until 2044.

References in this table are to the three legal instruments as follows: T for the Treaty, A for the Agreement and P for the Protocol.

Treaty element	Content	Article
Scope	Project purpose: enhance the use of water of the Senqu/Orange River to deliver specific water quantities to South Africa and generate hydropower in Lesotho	4T
	Establishment, implementation, operation and maintenance of Phases I and II of the Project	3T/2A
Substantive rules	Water delivery by Lesotho to South Africa for Phase I and subsequent phases (70m ³ per second and minimum water quantities)	5(1)T, 5(2)T, 6(7)T, 7(2)T, 7(9)T, 7(11)T, Annex IIT, Annex VA
	Minimum flow rates (in the Senqu/Orange) and downstream natural channels	6(9)T, 7(9)T, 7(11)T, 7(12)T
	Hydropower production in Lesotho ⁸⁵	4(1)T/Annex IT
	Water pollution prevention	6(15)T, 7(22)T
	Catchment conservation	7(22)T, 8(10)T
Procedural rules	Provision of operational implementation information by LHDA and TCTA to LHWC	7(15)T, 8(4)T

⁸² Given the extreme details each article contains it is a long document with over 80 pages.

⁸³ Note that compensation in the Treaty has a different meaning from the one intended in this report. It refers to compensation for the communities in Lesotho affected by the Project infrastructure construction (Art. 7(18) Treaty; Art. 15 Agreement).

⁸⁴ It is shorter than the Treaty with just over 60 pages.

⁸⁵ Hydropower production is mentioned but is secondary to the delivery of water to South Africa. The connection is the infrastructure of the Project and the use of the water flowing through it in Lesotho (see for instance Art. 7(23)).

Treaty element	Content	Article
	Close cooperation between LHDA and TCTA	/7(16)T/8(2)T
	Water quantity delivery monitoring by LHDA and TCTA	7(8)T, 8(3)T
	LHWC regular meetings to discuss issues regarding hydropower production in Lesotho and water delivery to South Africa	9(15)T
	Cost related payment arrangements	10T
	Project related financing arrangements	11T/13A
	Royalty payments	12T
	Payments for excess water, downstream releases and water abstractions	13T
Institutional mechanisms	Lesotho Highlands Water Commission (LHWC) (formerly the Joint Permanent Technical Commission)	6(6)T, 9T, 5P
	National implementation bodies: <ul style="list-style-type: none"> • Lesotho Highlands Development Authority (LHDA) - Lesotho • Trans-Caledon Tunnel Authority (TCTA) - South Africa 	6(4)T, 7/3P 6(5)T/4P
Dispute settlement	LHWC resolves water quantity measurement disputes	6(8)T/8(3)T
	Operational investigations and disputes	17A
	Conciliation, investigation and recommendations by the LHWC, arbitration	16T/6P/18A

3.4.4 The compensation mechanism

The basis for the compensation mechanism is the transfer of water to South Africa by Lesotho for which South Africa pays Lesotho royalties. Article 12 and its 27 paragraphs detail the mechanism including operational aspects of the payment. South Africa has been paying this royalty to Lesotho since the implementation of Phase IA of the Project.⁸⁶

The mechanism has two components: actual volumes of water delivered by Lesotho to South Africa and energy savings in South Africa based on that water volume.

It should also be noted that the cost of constructing the infrastructure was borne by South Africa for the water transfer component and by Lesotho for the hydropower component.

Volumetric allocation

Under the Treaty Lesotho must ensure the delivery to South Africa at the Designated Delivery Point⁸⁷ of minimum quantities⁸⁸ set out in the annexes of the Treaty and Agreement⁸⁹ at 70m³ per second.⁹⁰

Yearly operation plans are compiled by the LHDA at the end of year that indicate the projected water deliveries and power generation as well as possible operational contingencies.⁹¹ The plans also contain the schedule for monthly deliveries.⁹² The LHDA and TCTA measure the quantity of water delivered monthly.⁹³

The Treaty identifies situations where the volume delivered is different. Permitted excess water delivery⁹⁴ is compensated by South Africa.⁹⁵ Both countries also have the possibility of requesting additional water.⁹⁶ If the abstraction is requested by Lesotho, compensation is provided to South Africa.⁹⁷ If requested by South Africa, South Africa compensates Lesotho for losses in hydropower production and in royalty payments.⁹⁸

The water quantity specified under Annex 2 of the Treaty may be unilaterally adjusted by South Africa according to its needs⁹⁹ provided the amount is aligned with forecasted availability.¹⁰⁰

Energy savings

The basis for the royalty calculation is the actual amount of water delivered and the costs saved by South Africa by using that water rather than water from another transfer

⁸⁶ Art. 12(1).

⁸⁷ Defined at Art. 1(1).

⁸⁸ If a shortfall occurs, the quantity can be compensated for in the following six months using water delivered in excess of the amount scheduled for a monthly delivery (Art. 6(2)).

⁸⁹ See Annexure I of the Treaty and Annexure V of the Agreement.

⁹⁰ Art. 12 (2).

⁹¹ Art. 6(7).

⁹² Art. 7(4).

⁹³ Art. 7(8), 8(3).

⁹⁴ Art. 7(3), (6) and (7).

⁹⁵ Art. 12(17) and 13 (1). The payment is half of the operation and maintenance indicated at Art. 12(13) and (14).

⁹⁶ Art. 13(6) and (7).

⁹⁷ Art. 13(6). The payments are agreed by the countries.

⁹⁸ Art. 13(7).

⁹⁹ Art. 7(2).

¹⁰⁰ Art. 7(2).

infrastructure, the Orange Vaal Transfer scheme.¹⁰¹ That other infrastructure requires pumping to supply water whereas the Project relies on gravity for water delivery, which allows for energy savings in South Africa.

The royalty represents 56%¹⁰² of the capital, operation and management and electricity pumping costs saved in this manner.¹⁰³

The royalty has two components:¹⁰⁴

- Fixed: this represents the savings on capital costs and is a fixed amount paid monthly for 50 years from January 1995.¹⁰⁵
- Variable: this is calculated based on savings on operation and maintenance and pumping electricity, which are both dependent on the actual amount of water delivered to South Africa.¹⁰⁶ The amounts are calculated monthly and corrected yearly in line with producer price index.

Other operational aspects

Lesotho invoices South Africa on a monthly basis for the preceding month.¹⁰⁷ South Africa has 30 calendar days from the date of receipt to settle the invoices¹⁰⁸ at a special bank account with the Central Bank of Lesotho.¹⁰⁹

3.4.5 Execution by authorized power structures

The Treaty designates an authority at government level in each country and establishes three bodies to implement and supervise the implementation of the Project. Each country is responsible for the part of the Project located on its territory.¹¹⁰

The Treaty deals with Phase I arrangements and the Agreement with Phase II arrangements. There is some overlap but also changes in the responsibilities of the authorities established under the Treaty. In between the two, Protocol VI made adjustments to the two national bodies. Changes are highlighted below.

The 'designated authorities' at government level are:

- Lesotho: The Ministry of Water, Energy and Mining,¹¹¹ now the Ministry of Natural Resources;¹¹²

¹⁰¹ Art. 12(2).

¹⁰² Art. 12(1).

¹⁰³ Art. 12(1), (2), (6), (7) and (8).

¹⁰⁴ Art. 12(9), (10).

¹⁰⁵ Art. 12(9)(a), (10)(a), (11), (12), (15).

¹⁰⁶ Art. 12(9)(b) and (c), 10(b) and (c), (13), (14), (16), (18).

¹⁰⁷ Art. 12(22).

¹⁰⁸ Art. 12(23).

¹⁰⁹ Art. 12(26).

¹¹⁰ Art. 6(2) and (3).

¹¹¹ Art. 2(1)(a).

¹¹² <https://www.water.org.ls/>.

- South Africa: the Department of Water Affairs,¹¹³ now the Department of Water and Sanitation.¹¹⁴

The Treaty also establishes the national implementing authorities, which are maintained and added to under Protocol VI and the Agreement:

- Lesotho: the Lesotho Highlands Development Authority (LHDA),¹¹⁵ which is attached to the Ministry mentioned above.¹¹⁶
- South Africa: the Trans-Caledon Tunnel Authority (TCTA),¹¹⁷ which is an agency of the Department mentioned above.¹¹⁸

The national implementing authorities have respective duties listed separately. Some are also mentioned jointly, for instance the obligation to raise money to carry out the Project,¹¹⁹ which is a requirement for successful project phase implementation.¹²⁰ Each country must also provide both authorities with the necessary powers to execute the project on its territory.¹²¹

Lesotho

The LHDA is responsible for the Project in Lesotho, where the largest section of infrastructure is located. Its responsibilities are listed at Art. 7 of the Treaty, which contains 44 paragraphs.¹²²

In summary, its duties include the implementation, operation and maintenance of the part of the Project in Lesotho, and particularly the delivery of water in agreed quantities to South Africa. These functions are broken down into different aspects ranging from the preparation of the operation plan¹²³ already mentioned to monitoring monthly the actual delivery¹²⁴ and maintaining appropriate flows where necessary.¹²⁵ Catchment protection measures are also included.¹²⁶

The comprehensive list of responsibilities also includes management elements such as standards, accounting and management information systems.¹²⁷ Reporting for costs and funding for the hydro-electric generation is also one of the LHDA tasks.¹²⁸ Auditing,¹²⁹ banking,¹³⁰ and insurance¹³¹ are operational aspects also covered.

¹¹³ Art. 2(1)(b).

¹¹⁴ <https://www.dws.gov.za/>.

¹¹⁵ Art. 6(4) and 7, <https://www.lhda.org.ls/lhdaweb/>.

¹¹⁶ <https://www.water.org.ls/water-sector/>.

¹¹⁷ Art. 6(5) and 8, <https://www.tcta.co.za/>.

¹¹⁸ <https://www.tcta.co.za/about-tcta/>.

¹¹⁹ Art. 11(1).

¹²⁰ Art. 11(2).

¹²¹ Art. 6(10).

¹²² This includes the amendments introduced by Protocol VI.

¹²³ Art. 6(7).

¹²⁴ Art. 6(8).

¹²⁵ Art. 6(9), (11) and (12).

¹²⁶ Art. 6(22).

¹²⁷ Art. 6(17), (19)-(21).

¹²⁸ Art. 6(23)-(25).

¹²⁹ Art. 6(26).

¹³⁰ Art. 6(27)-(30).

¹³¹ Art. 6 (31).

The composition of the LHDA is presented, including details of the Board of Directors and Chief Executive position and duties.¹³² Protocol VI made changes to this set-up. The composition of the Board of Directors and mode of board appointment have been changed. There is now at least one non-executive board member from the public.¹³³ The powers of the Board have also been amended so that it appoints the Chief Executive, may delegate powers and reports to the LHWC.¹³⁴

Under the Agreement, a Technical Sub-Committee is established to advise the Board on technical, environmental and social issues related to Phase II implementation.¹³⁵ There is also a Project Management Unit for the operational implementation of Phase II.¹³⁶

South Africa

The duties of the authorities in South Africa are set out in three stages depending on the status of the infrastructure. The first is during the construction of Phase I for which the TCTA is the authority responsible for the Project in South Africa with its duties listed in Art. 8 of the Treaty. Between the end of that Phase and the start of Phase II, Art. 8A (introduced by Protocol IV) amends the TCTA duties. Art. 8B (also introduced by Protocol VI) outlines the duties of the Implementing Authority established in Protocol VI for the implementation of Phase II.

The 28 paragraphs of Art. 8 of the Treaty detail the TCTA Phase I responsibilities for Phase I. These provisions and those of Art. 8B and its 30 paragraphs are very similar and mirror many of the duties of the LHDA with some differences. A key element is the responsibility for the part of the conveyance system located in Lesotho and given powers by Lesotho to fulfil this obligation on its territory in liaison with the LHDA.¹³⁷ The implementing obligations were completed when Phase I ended and have resumed with Phase II.¹³⁸ Operating and maintenance duties¹³⁹ and water delivery monitoring obligations jointly with the LHDA¹⁴⁰ have been ongoing as well as catchment conservation measures to prevent the pollution of water to South Africa.¹⁴¹

Other ongoing duties include: management responsibilities with standards, accounting and management information systems;¹⁴² cost and funding reporting;¹⁴³ and auditing, banking and insurance.¹⁴⁴

¹³² Art. 6(32)-(40) as amended by Art. 3 of Protocol VI.

¹³³ Art. 7(33)(a) as inserted pursuant to Art. 3 of Protocol VI.

¹³⁴ Art. 7(35), Art. 7(34) and Art. 7(41)-(43) as inserted pursuant to Art. 3 of Protocol VI.

¹³⁵ Art. 6(1) of the Agreement.

¹³⁶ Art. 6(2) of the Agreement.

¹³⁷ Art. 8(2) and Art. 8B(1)-(2).

¹³⁸ Art. 8(3) Treaty and Art.8B(1).

¹³⁹ Art. 8(1), Art 8A(1) and Art. 8B(2).

¹⁴⁰ Art. 8(3) and 8A(2).

¹⁴¹ Art. 8A(7), Art. 8A(7) and Art. 8B(7).

¹⁴² Art. 8(6)-(9), Art. 8A(3)-(6) and Art. 8B(3)-(6).

¹⁴³ Art. 8(11)-(13), Art. 8A(8)-(10) and Art. 8B(8)-(10).

¹⁴⁴ Art. 8(14)-(19), Art. 8A(11)-(16) and Art.8B(11)-(16).

The final paragraphs relate to the management and staff of the TCTA.¹⁴⁵ After the adoption of Protocol VI and until Phase II, a Head of Operations was in place appointed by the LHWC.¹⁴⁶ The situation during Phase II is similar to Phase I¹⁴⁷ with a Board of Directors and a Chief Executive though with changes introduced by Protocol VI. In Phase II, the composition, duties and mode of appointment of the Board of Directors have changed. There are now non-executive members from the public that are appointed chair and vice-chair of the Board.¹⁴⁸ The Board is also appointed by the LHWC rather than by South Africa¹⁴⁹ and is accountable to it¹⁵⁰ with regular reporting duties.¹⁵¹ A Chief Executive appointed by the Board in consultation with the LHWC is in place.¹⁵²

The Joint Body

The joint implementing body is the Lesotho Highlands Water Commission (LHWC)¹⁵³ (formerly the Joint Permanent Technical Commission).¹⁵⁴ Its functioning is described in Art. 9 of the Treaty, which has been amended by Protocol VI.¹⁵⁵

The LHWC is composed of three representatives from Lesotho and three from South Africa.¹⁵⁶ The joint body has legal personality in each country,¹⁵⁷ establishes its own rules and procedures,¹⁵⁸ with all decisions made by agreement of both delegations.¹⁵⁹

An important change introduced in Protocol VI is that the LHWC is responsible and accountable for the Project to the two governments and is considered to be acting on their behalf, as well as advising them.¹⁶⁰ It also monitors and advises the LHDA and TCTA and can order management audits on both.¹⁶¹ The scope of consultations of the LHWC by the LHDA and TCTA and approvals required of the LHWC on operational matters is listed under Art. 9(11). Its role and the role of the Board of Directors and Head of Operation has been clarified by amendments to this article: it has overall strategic responsibility that the Board/Head of Operation must implement; moreover, the latter are accountable to the LHWC.¹⁶² Members of the LHWC enjoy the privileges and immunities at Annex III of the Treaty.

¹⁴⁵ Art. 8(20), Art. 8A(17) and Art. 8B(17).

¹⁴⁶ Art. 8A(18)-(24).

¹⁴⁷ Art. 8((21)-(28).

¹⁴⁸ Art. 8B(18)-(19).

¹⁴⁹ Art. 8B(18)-(19).

¹⁵⁰ Art. 8B(20).

¹⁵¹ Art. 8B(27).

¹⁵² Art. 8B(23), (25).

¹⁵³ Art. 6(6) and 9.

¹⁵⁴ Art. 2 Protocol VI.

¹⁵⁵ Art. 5 Protocol VI.

¹⁵⁶ Art. 9(1).

¹⁵⁷ Art. 9(7).

¹⁵⁸ Art. 9(6).

¹⁵⁹ Art. 9(3).

¹⁶⁰ Art 9(8) as amended by Protocol VI.

¹⁶¹ Art. 9(9)-(10) as amended by Protocol VI.

¹⁶² Art. 9(11)(a) as amended by Protocol VI. Previously under Art. 9(14) decisions affecting only hydropower production in Lesotho and decisions by the TCTA on matters regarding the part of the project in SA did not require its approval but this has been removed by Protocol VI.

Examples of the items requiring consultation and approval from the LWHC include: maintenance plans, Projects designs and tenders, consultant appointments, financing arrangements, staff appointments at the LHDA and TCTA and so forth.

The remainder of Art. 9(11)¹⁶³ deals with the practicalities of the operation and meetings of the LWHC, including its ability to establish non-executive sub-committees to deal with specific issues (finance, environment, legal).¹⁶⁴ The LHWC is also involved in dispute resolution mechanisms.¹⁶⁵

3.4.6 Specific comments

Economic aspects

The Treaty and Agreement refer to economic aspects. The royalty mechanism and other payments described above are the most obvious ones. Project cost payments¹⁶⁶ and apportionments¹⁶⁷ are also detailed to what is covered in the costs with the general rule that each country is responsible for the portion on its territory.¹⁶⁸ Financing is another key element with rules in the Treaty and Agreement, the latter requiring the use of the most cost effective and efficient financing available.¹⁶⁹ Taxes are another substantive element mentioned in the Agreement with rules set out at Art. 14 detailing where and what taxes (income tax, VAT, etc) are to be paid by who.¹⁷⁰

The Agreement includes hydropower arrangements with South Africa to facilitate the sale of peak electricity from the Kobong pump storage scheme from Phase II, and the purchase of electricity by Lesotho for pumping needs of the scheme.¹⁷¹

The Agreement also provides for the adoption of a comprehensive anti-corruption policy based on best practices for international construction projects following the experience of Phase I.¹⁷²

Compensation for communities affected by the Project is part of the Treaty and the Agreement.¹⁷³

Art. 4(2) of the Treaty permits developments for other water uses: water for irrigation, potable water supply, development of other hydropower projects and the development of tourism, fisheries and other projects for economic and social development.

Beyond what is set out in the Agreement, the economic aspects of the Project have been noted because of its impact on both countries. Lesotho required electricity to develop itself it has been noted that the royalties received by are its largest non-tax revenue and contribute

¹⁶³ Art. 9(15)-(33).

¹⁶⁴ Art. 9(29)-(31) as introduced by Protocol VI.

¹⁶⁵ Art. 16T/Art. 17A.

¹⁶⁶ Art. 10T.

¹⁶⁷ Art. 12A and Annexure II.

¹⁶⁸ Art. 10(1), (2)T.

¹⁶⁹ Art. 13(1).

¹⁷⁰ See also Annexures III (list of dues and charges) and Annexure IV (income tax arrangements).

¹⁷¹ Art. 8(1)A.

¹⁷² Art. 16A.

¹⁷³ Art. 17(18)T expanded in Art. 15A.

approximately 10% to its overall GDP.¹⁷⁴ In addition to the royalty payments, GDP contributions include customs revenues from large material imports and tax revenue and indirect contributions include other infrastructure developments such as roads, bridges, communication and urban.

Water commoditization

The royalty payment is calculated based on the amount of water delivered together with the savings made on the cost of electricity by South Africa. Thus, the payment is not solely tied to a price attached to water. Nevertheless, it has been argued that this under the arrangement in place, water is a good transferred by one country to another by way of a treaty.¹⁷⁵

Withdrawal limitations

Lesotho must ensure the delivery of water volumes indicated in the Treaty and Agreement. Requests for water releases by Lesotho, to be compensated for, are possible as noted above.¹⁷⁶ Aside from this specific situation, there are no particular prohibitions or indications on withdrawal though any withdrawal would be subject to the guaranteed transferred water volume under the Treaty. Should it not be respected, Lesotho would be in breach of its international obligations towards South Africa. This could lead to a possible demand for reparation under the rules of state responsibility. A noted exception to this is any hydrological extreme, or other natural event (including drought) that affects water delivery to South Africa.¹⁷⁷ In this case both parties must consult to agree mitigating and restoration measures.

Proportionality allocation

There is no proportional allocation provided for in either the Treaty or the Agreement. There are no specific references to scarcity though as noted above droughts affecting water delivery are considered a possibility.

3.4.7 Analysis

General comments

The Treaty and Agreement are bilateral treaties with a specific focus on an infrastructure project with multiple phases resulting in a water transfer from Lesotho to South Africa and hydropower generation for Lesotho. They can be characterized as constituting the treaty basis for international water transfers as mentioned above. This is one of the few examples of such treaties and transfers.¹⁷⁸

The Treaty is a combination of a framework agreement for some aspects and a specific one for the first phase of the Project with the Agreement providing the detail of the second phase. Consequently, the Treaty is very detailed and also reads like a commercial and construction agreement with very practical¹⁷⁹ and lengthy details. For ease of understanding and

¹⁷⁴ Vinti, Clive. (2021). The Treaty on the Lesotho Highlands Water Project and the principle of "equitable and reasonable utilisation". *De Jure Law Journal*, 54(1), 328-346. <https://dx.doi.org/10.17159/2225-7160/2021/v54a19>.

¹⁷⁵ Brown-Weiss, E. (2013) *International Law for a Water-Scarce World*, Martinus Nijhoff, p.252.

¹⁷⁶ Art. 13(6)T.

¹⁷⁷ Art. 14.

¹⁷⁸ Brown-Weiss E., (footnote 179), pp. 252-256 which describe other types of arrangements.

¹⁷⁹ For instance, the provision of visas (Art. 6(12)) or the imports of material (Art. 6(17)).

navigation the Treaty and Agreement, the very practical details could be incorporated in protocols rather than the body of the treaty.

Any changes to those detailed terms must be agreed by the countries whether to amend the Treaty or through the adoption of protocols as has been done. This lack of in-built flexibility is easier to overcome if the relationship between the parties is good than in a more tense context but this has not been flagged as an issue so far.

An interesting and unusual practical element that is associated with the Project is the inability of either party to 'interfere unilaterally' with the flow of water to South Africa because of the design of the conveyance system for the discharge from the most downstream hydropower station in Lesotho¹⁸⁰ under a general obligation not to unilaterally interfere with the water delivery.¹⁸¹

The compensation mechanism is conceptually simple but complicated to calculate. Its description in the Treaty is challenging to understand highlighting the need for clear descriptions of such mechanisms and their operation. One of the potential issues of the mechanism is the obligation for Lesotho to provide water at a certain flow. Climate change impacts may affect the delivery of water in the future and the water transfer may become vulnerable as a consequence.¹⁸² This raises issues about prioritizing water availability in Lesotho for domestic consumption against compliance with international obligations with criticism that because equity is not incorporated in the Treaty Lesotho is vulnerable.¹⁸³ There are also no specific mechanisms to adjust the Treaty on this particular issue even if the parties are invited to consult should an extreme event affect water delivery to South Africa and could renegotiate the terms of the Treaty if necessary.

Although the Project is considered to have brought economic benefits and job creation to Lesotho, poverty levels have not reduced in the population affected by the Project. The social and environmental impacts have been criticised¹⁸⁴ as the Treaty comes under review in 2023.¹⁸⁵ Moreover, the newly elected Lesotho government has been questioning Phase II as the country is still importing electricity from South Africa at high cost despite the Project. There has also been less water delivered than anticipated raising issues about deliveries and electricity production.¹⁸⁶

Finally, institutional changes were introduced in Protocol VI reflecting concerns about corruption around the Project. This highlights the challenges such projects present and the need to consider carefully the institutional framework in place to implement and operate infrastructure and to manage the compensation mechanisms successfully.

Specific comments

¹⁸⁰ Art. 5(3).

¹⁸¹ Art. 6(8).

¹⁸² Vinti Ibid.

¹⁸³ R. Mabula, University of Wiotwatersrand, 18 May 2018 'Whose water is it anyway?'

¹⁸⁴ Lesotho Times, 27 February 2021 'Water project up for review'.

¹⁸⁵ Press articles refer to a 12-year review cycle that is not mentioned in the Treaty.

¹⁸⁶ SABC News, 28 August 2023, 'Lesotho Highlands Water Treaty undergoes review every 12 years'.

A preliminary point to note is that the situation in this case study differs somewhat from the situation of Kyrgyzstan. Here the question for the downstream country, South Africa, is to provide water to its Gauteng region by way of a transfer or diversion of water rather than from an existing shared source, and to find the least costly solution for that, which is what the Project represents. This element of diversion differentiates it from the situation at hand and does not allow for a comparison on that basis. Moreover, there is no storage of water upstream but a channelled flow of water that produces hydropower upstream for the national energy market.

Nevertheless, it offers helpful insights into the sharing of benefits and the construction of an economic mechanism. A central point to note is the basis for calculation which includes a volumetric measurement and electricity savings. The volumetric element could be compared to a volume withheld in a reservoir, as is the case with the Toktogul. The calculation of the electricity saving, which includes capital costs as well as operation and maintenance, gives an indication of possible elements to take into account (even if in the case of the Project it is money saved rather than actually spent). The correlation between the two could be inspire the economic mechanism to be developed for Kyrgyzstan and its neighbours with a connection between the amount being stored and the storage costs.

Another interesting point is the terminology used: South Africa is paying 'royalties' to Lesotho, which is one way of referring to a payment for the use of an asset. The point here is to highlight the flexibility to give a name that is acceptable to all the parties to the mechanism that will be put in place, whether economic mechanism or something else.

Beyond these two points the Treaty and Agreement present few other advantages because of the differences between the two factual situations. The Treaty was agreed prior to the construction of the infrastructure rather than after it. It also contains fixed allocations (expressed in flow), which may present challenges because of possible climate change impacts on water availability. This is another reminder of the need to have a multi-term perspective and consider and acknowledge not just the present situation but also the medium and long-term future and the variations that may occur within those timeframes.

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3.5 The Mekong River Basin Agreement

3.5.1 Background

The Mekong is one of the longest rivers in South Asia. It has its source in the Himalayas and flows for five thousand kilometres through China (where it is called the Lancang), Myanmar, Thailand, Lao PDR, Cambodia and Vietnam. It is often divided into the Upper and Lower Mekong River Basin with China and Myanmar covering the upper part and Thailand, Laos, Cambodia and Vietnam the lower part.

The river has a series of tributaries on its left and right bank. It is characterised by a changing topography, drainage patterns and geomorphology. Flooding is a characteristic of the lower basin with varying consequences on livelihoods including causing costly damages. Climate change is considered to intensify destructive floods with important socio-economic impacts. It is also causing droughts that impact agricultural activities and navigation.

Approximately 65m people live in the Lower Mekong River Basin and are heavily dependent on the river for their livelihoods. The population is expected to increase to about 100m in the coming decade putting additional pressure on the resource.

There has been significant hydropower development on the main stem of the river and on its tributaries in the upper and lower basins, some of which has caused disputes between the basin countries.¹⁸⁷ Energy production has been developed to meet demand and support economic growth. It is anticipated more dams will be constructed in the coming years.

As is developed further below, there is a water agreement in place that includes the lower basin riparian countries but China and Myanmar are not parties to it. Instead, China has established the Lancang-Mekong cooperation framework that includes all the basin countries and deals, amongst other things, with water issues.

¹⁸⁷ This includes the Xayaburi dam and the Don Sahong Dam in Laos, which were disputed by Cambodia and Vietnam.

Basin map:



Source: Wikipedia¹⁸⁸

3.5.2 Treaty background and status

The treaty in place is the 'Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, signed in April 1995 (Agreement). It binds Vietnam, Laos, Cambodia and Thailand. It is currently in force.

In parallel, China established in 2016 the Lancang-Mekong Cooperation (LMC). This is not an international treaty but a non-binding instrument that brings together all the Mekong basin riparians.¹⁸⁹

3.5.3 The treaty

This section begins with an overview of the Agreement as presented previously. In the absence of a formal treaty, the following elements of LMC are described: background, approach then information about the institutional element and the Lancang-Mekong Resources Cooperation Centre.

Agreement

¹⁸⁸ https://en.wikipedia.org/wiki/Mekong#/media/File:Mekong_river_basin.png.

¹⁸⁹ <http://www.lmcchina.org/eng/index.html>.

The Agreement contains 42 articles and 1 Protocol. The MRC has also adopted procedures for: data and information exchange and sharing; water use monitoring; notification, prior consultation and agreement; maintenance of flows on the mainstream; and water quality.

Treaty element	Content	Article
Scope	Cooperation in the sustainable development, utilization, management and conservation of the Mekong, including hydropower	1
Substantive rules	Principles: reasonable and equitable utilisation; prevention and cessation of harmful effects	5, 7
	Environmental aspects: protection; maintenance of flows on mainstream	3, 6
	Freedom of navigation	9
	State responsibility	8
Procedural rules	Notification for intra-basin uses and inter-basin diversions	5
	Formulation of a basin development plan	2
	Warning system for emergency situations	10
Institutional mechanisms	Mekong River Commission	11-14
	Council	15-20
	Joint Committee	21-27
	Secretariat	28-33
Dispute settlement	Commission first step for dispute settlement; then intergovernmental negotiations and finally mediation	34-35

LMC

The LMC is not characterised by a formal international legal instrument so is not analysed according to the same criteria as the Agreement.

The LMC was launched in 2016 with the ‘Sanya Declaration of the First Lancang-Mekong Cooperation Leaders’ Meeting’.¹⁹⁰ The theme of that meeting was ‘Shared river, Shared future’ highlighting the geographical element that brings all the countries of the LMC together. The Declaration mentions the 3+5 approach, which consists of three pillars (political and security issues; social cultural and people-to-people exchanges; economic and sustainable development) and five cooperation areas (agriculture and poverty reduction; water resources; production capacity; cross-border economic cooperation; connectivity).¹⁹¹

¹⁹⁰ Sanya Declaration: http://www.lmcchina.org/eng/2016-03/23/content_41449864.html.

¹⁹¹ http://www.lmcchina.org/eng/2017-12/14/content_41449855.html.

The Declaration also refers to specific areas of cooperation around water and energy. These include; cooperation on water and energy security (n.4); improving the river including infrastructure (n.7); expanding production capacity cooperation including renewable energy (n.8); establishing the Lancang-Mekong Water Resources Cooperation Centre to enhance cooperation on sustainable water cooperation and utilization (n.10); and encouraging clean energy (n.15).

The following are also specific water issues under the cooperation: sustainable water resources management and utilization; water governance improvement; and minimising the river's negative impact on livelihoods and on the environment. Working groups are one way in which the LMC operates and one of them, convened first in 2017,¹⁹² deals with water resources as well as with regional power connectivity and energy cooperation.¹⁹³

The institutional structure of the LMC is summarised in the diagram¹⁹⁴ below:



Each country has also established a LMC national secretariat.

There are consultation and cooperation mechanisms at all levels indicated in the diagram with strategic planning at the level of the leaders, cooperation discussions at the two levels below and execution of activities by the working groups indicated.

Water is also dealt with by the Lancang-Mekong Resources Cooperation Centre. Its activities to date are set out in a five-year action plan focusing on six areas: water resources and green development; IWRM and climate change adaption; water sector production capacity cooperation; rural areas, water conservancy and livelihood improvement; sustainable hydropower development and energy security; and transboundary river cooperation and information sharing.

The Centre acts as a data, information and knowledge sharing platform. Joint studies are also carried out under its supervision. Additional activities are policy dialogues, capacity

¹⁹² http://www.lmcchina.org/eng/2021-03/16/content_41479607.html.

¹⁹³ http://www.lmcchina.org/eng/2021-05/08/content_41554693.html.

¹⁹⁴ Source: R. Junlin et al, 'New transboundary water resources cooperation for Greater Mekong Subregion: the Lancang-Mekong Cooperation' *Water Policy* (2021) 23 (3): 684–699.

building and joint projects. Interestingly, the Centre also has an MoU with the MRC to cooperate in the same areas.

3.5.4 The compensation mechanism

The Agreement does not contain any compensation mechanism as such. As explained in section 3.5.6 below, there is a notable lack of explicit cooperation between the Agreement parties, which implicitly confirms the absence of any such mechanism.

The LMC makes no reference to any compensation mechanism either. Its focus seems to be on developing activities.

3.5.5 Execution by authorized power structures

The MRC is the principal institution under the Agreement with three bodies (council, joint committee and secretariat) with the council and joint committee formed of members from each riparian states. There are no references to actual national authorities. It is assumed the connection is achieved through the country representatives, which are officials of each government.

In fact, there are separate regional agreements regarding energy, which include hydropower and other means of energy production.¹⁹⁵ It also appears that the sale of power produced by one country is done through separate and direct agreements.¹⁹⁶

The LMC structure does not make reference to national power authorities. Decisions about strategic issues are made at the ministerial meeting level and presumably communicated internally by each representative.

The LMC Water Centre has its own staff,¹⁹⁷ which do not appear to be related to national authorities.

No actual power structures are referred to in either case.

3.5.6 Specific comments

Economic aspects

The Mekong River has different economic implications for the riparian countries. For Laos and Thailand, the focus is more on hydropower production while for Cambodia and Vietnam it is farming and fisheries. Hydropower is a significant resource for Laos that sells it to Thailand.

The Preamble of the Agreement recognizes the value of the basin for the economic and social well-being of the people living there and refers to cooperating in a 'constructive and mutually beneficial manner' to sustainably develop the basin for the same purpose. It also makes reference to the 'promotion of interdependent sub-regional growth and cooperation among the community of Mekong nations taking into account the regional benefits that could

¹⁹⁵ Asian Development Bank. Greater Mekong Subregion power trade and interconnection: 2 decades of cooperation. Mandaluyong City, Philippines: Asian Development Bank, 2012.

¹⁹⁶ T. Iamphayphan et al, 'Export Supply of Electricity from Laos to Thailand: An Econometric Analysis' International Journal of Energy Economics and Policy, 2015, 5(2), 450-460.

¹⁹⁷ It consists of a Secretary General, Deputy SG and staff responsible for general affairs, external relations, cooperation programs and training and information.

be derived...from activities with the...basin'. Article 1 reinforces this message by mentioning explicitly the areas of cooperation between the riparian countries, which include hydropower as well as irrigation, navigation, flood control, fisheries, timber floating, recreation and tourism. Moreover, it emphasises cooperation in these areas must optimize mutual benefits of all riparian states.

However, the Agreement is silent on how this must be made operational. The Council within the MRC is the body responsible for making policies to achieve these objectives.¹⁹⁸ The Joint Body is the body that formulates a basin development plan¹⁹⁹ that would include economic aspects. Thus, to assess how this is done in practice one must turn to policy documents adopted by the MRC.

The most recent development strategy document, the 'Basin Development Strategy for the Mekong River Basin 2021-2030 & MRC Strategic Plan 2021-2025',²⁰⁰ includes economic development and hydropower issues. Notably, lower basin cascading hydropower operation is characterized as uncoordinated indicating a lack of cooperation on such issues. Another point is that hydropower is one of many other topics that are addressed in the basin. The negative impacts of upper Mekong hydropower development are also mentioned, implying again coordination limitations between the upper and lower riparian countries. The reason it mentions for that is planning being largely done at a national level, independently, and that regional planning 'has been limited to assessing the acceptability of the transboundary impacts of national plans'.²⁰¹

It is therefore clear that more coordination is necessary to optimise the economic development of the lower basin. Indeed, the comments above relate only to the downstream riparian. For a broader perspective, the activities of the LMC must be considered since it involves all countries. One of the clear objectives of the LMC is regional economic and social development through a shared vision and objectives. The working groups are responsible for different areas related to these objectives, including water and energy as already mentioned. Sustainable hydropower development is one of the areas that the water working group is considering. However, this is loosely organised rather than being specific and providing the reliability and predictability that the riparian countries may be seeking. The activities of the Water Centre listed on the website include capacity building and studies and not more concrete projects and coordination mechanisms. The approach so far seems cautious and slow.

Water commoditization

There is no water commoditization under the Agreement nor under the LMC.

Withdrawal limitations

¹⁹⁸ Art. 18 (A) and (B).

¹⁹⁹ Art. 24 (B).

²⁰⁰ Mekong River Commission. (2021). The integrated water resources management-based Basin. Development Strategy for the Lower Mekong Basin 2021–2030 and the MRC Strategic Plan 2021–2025. Vientiane: MRC Secretariat.

²⁰¹ *Ibid.*, p. xvii.

The Agreement does not contain any specific withdrawal limitations nor does the LMC.

Proportionality allocation

Utilization of the water of the Mekong is conducted according to the principle of reasonable and equitable utilization with notification procedures in the event of intra-basin uses and inter-basin diversions.²⁰² Flow maintenance is another Agreement obligation²⁰³ that has indirect allocation implications but these are not proportional.

The LMC makes not reference to allocation.

Scarcity is also not mentioned in the Agreement nor in the LMC.

3.5.7 Analysis

General comments

The Agreement is a traditional transboundary water cooperation agreement with four parties and with a broad scope including but not limited to hydropower. It is also a framework agreement that requires additional activities such as planning to have a practical impact. The Agreement has been in place for almost 30 years and has an impressive portfolio of activities in different fields conducted by the MRC as can be seen on its website. Nevertheless, the latest strategy document gives an indication of what still needs to be done to achieve the objectives of the Agreement. It highlights the lack of coordination between the parties and the impact on different water-related areas. In fact, there have been cases of disputes around the construction of hydropower. The case of the Xayaburi dam is one of them. There are therefore serious limitations under the Agreement.

Against this background, the LMC is adopting a different approach from a legal point of view and from other aspects. It is more recent but broader in its members since China and Myanmar are included. It has stated clearly its focus on water. However, at present the LMC cooperation seems to focus principally on information sharing including in the area of hydropower.

The LMC was established after the construction of dams in upper basin and the information shared relates to changes of operation rather than substantial discussions with lower riparian countries on actual operational measures. The role of Water Centre role is not as a platform for decision-making but for supporting discussions at the higher levels in the institutional hierarchy of the LMC. These have the general intention to cooperate but it is difficult to see how this will develop in the absence of a more structured and principled mechanism.

It is perhaps too early to appreciate fully the impact on water and energy coordination in the context of the LMC and the MRC as the LMC was only recently established. There are, nevertheless, possible overlaps between the two, which might operate in parallel in the absence of more formal arrangements to clarify their relationship and their respective mandates towards each other. There could be difficulties for the lower riparian countries that

²⁰² Art. 5.

²⁰³ Art. 6, 26 and Procedures for the Maintenance of Flows on the Mainstream.

are bound by international obligations under the Agreement if they may have to consider LMC measures that are not fully aligned with their Agreement obligations.

What is clear in the Mekong is that there is limited coordination and no compensation mechanism at present. Moreover, the absence of clear and formal rules within the LMC may make issues more awkward and leave more space for some riparian countries than for others.

Specific comments

There are limited insights for Kyrgyzstan to draw from the situation of the Mekong though it makes the case for have clear obligations and linkages between water and energy. Although there are notification procedures in place, some of the Mekong countries have proceeded to construct hydropower without taking into account the impact downstream. The main volumetric requirement is to ensure minimum flow but there seems to be limited coordination between the Agreement countries, which points to limited consideration towards downstream countries. In that regard the situation is different from Kyrgyzstan's position since it has been releasing water to downstream countries during the summer season. Another difference is that electricity is generated upstream for sale to downstream countries on a continuous basis and there are no elements indicating any water storage for later release. However, the sale of the electricity seems to be done on a market basis but this is conducted pursuant to commercial agreements rather than in an international treaty and it may not always be possible to know the terms agreed and the basis for calculation.

Considering the LMC, it is too early to draw lessons from the way it functions to assess whether a non-binding framework could help operationalising the water-energy nexus. The advantage of the absence of binding obligations is the flexibility and speed it can give parties to agree measures though that absence may also lessen the willingness to comply since non-compliance does not have any legal consequences. In that context, the economic and political situation of each country may be a bigger factor influencing the kinds of measures adopted and the impact of not implementing them.

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3.6 Agreement between Switzerland and France on the Emosson Hydroelectric Project

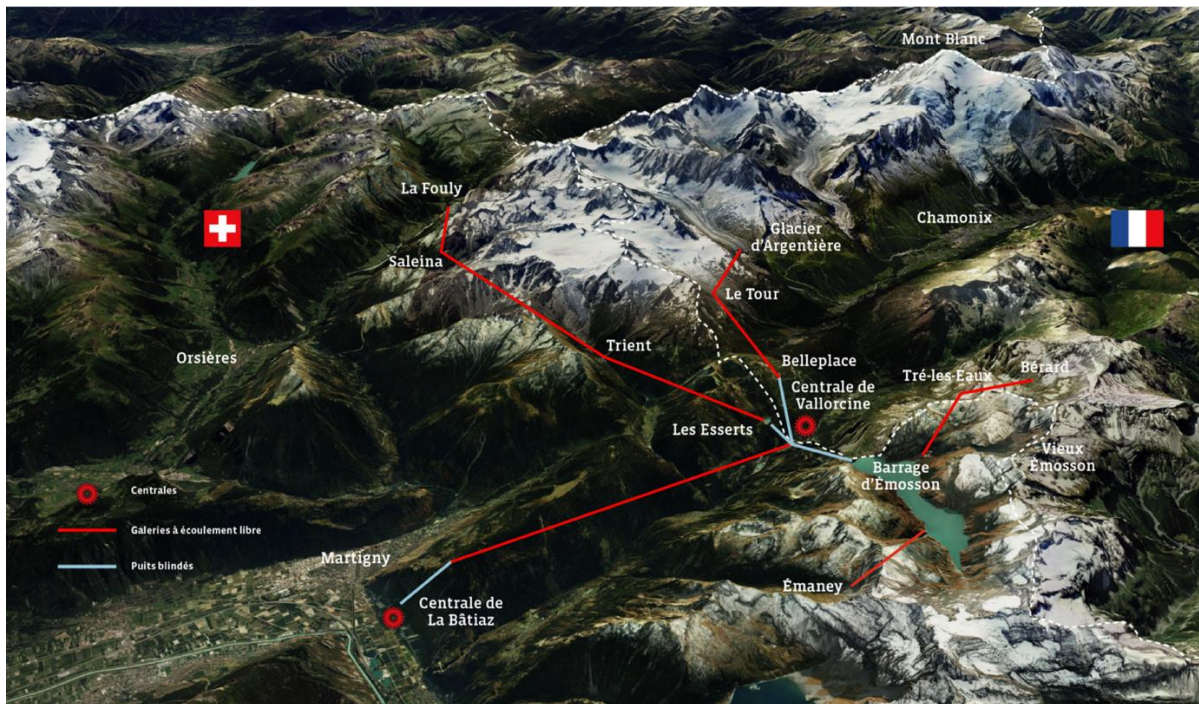
3.6.1 Background

The hydroelectric project that is the subject of this section straddles the French and Swiss territories. Water for the reservoir is drained through a network of tunnels from valleys and glaciers in the French Haute-Savoie department and from valleys in the Swiss canton of Valais. Water draining from France also contributes to the Arve River that flows from the region to Geneva and meets the Rhone in the centre of that city. This is relevant because of the existence of a compensation mechanism for the use by Switzerland of this water, described below.

The hydropower dam itself is located on both sides of the border being considered the most favourable location to maximise the hydraulic force of the waters draining from the region. There is one plant in France and one in Switzerland.²⁰⁴ The 225m m³ reservoir is located in Switzerland. It is the second largest hydropower infrastructure in Switzerland. Construction was completed in 1973 and operations started in 1975.

Hydropower production at the Emosson contributes almost 3% of the energy produced in Switzerland.

Basin map:

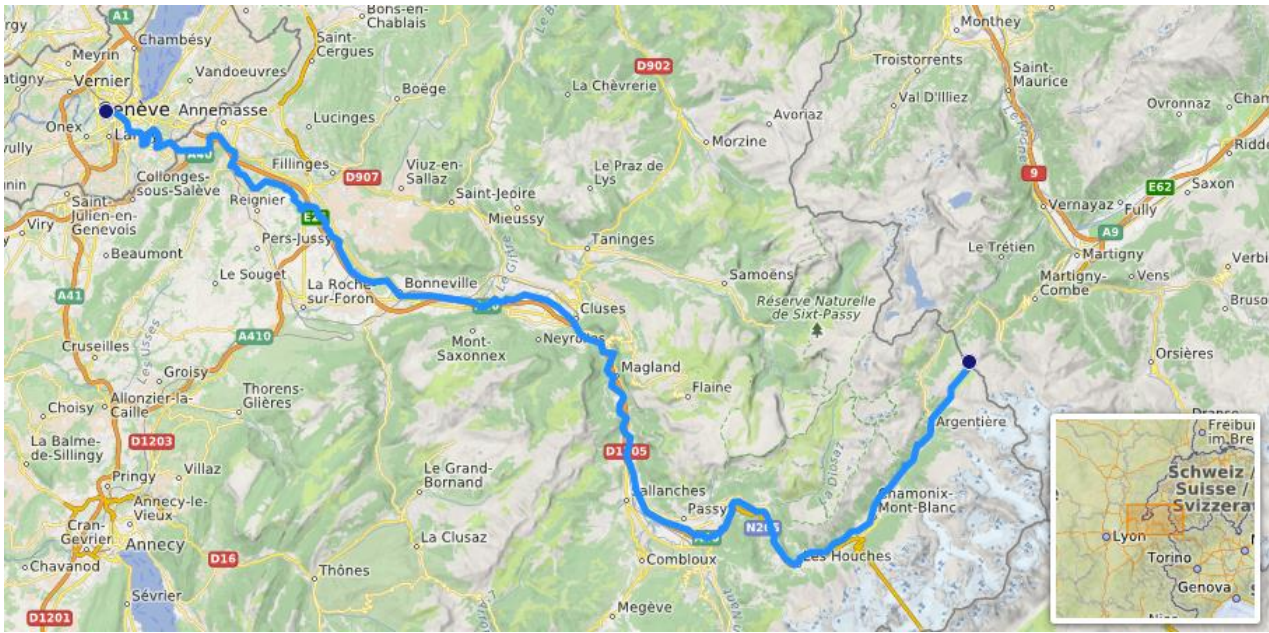


Source: Emosson website²⁰⁵

Map of the Arve basin:

²⁰⁴ This was achieved through an exchange of territory mentioned in the Treaty (Art. 24-25).

²⁰⁵ <https://emosson.ch/amenagements#fancybox-group-1767>.



Source: Wikipedia²⁰⁶

3.6.2 Treaty background and status

The treaty, in French, entitled ‘Convention entre la Confédération suisse et la République française au sujet de l’aménagement hydroélectrique d’Emosson’²⁰⁷ was signed in 1963 and came into force in 1964 (Treaty). It remains in place today.

Both countries have granted concessions for a duration of 80 years after the operational start of the infrastructure,²⁰⁸ which will run until 2055. Ten years before the concessions expire the parties will consider whether to continue to exploit the infrastructure.²⁰⁹

3.6.3 The treaty

The Treaty contains 26 articles.

Treaty element	Content	Article
Scope	Hydropower production and sharing between the two countries through a sole operator	Preamble
	Delimitation of the waters within the scope of the Treaty	1
Substantive rules	Pre-construction regulations	2, 3
	Infrastructure operation regulations	3
	Equal right to the utilisation of the infrastructure	5(2)
	Energy production sharing	5(3)-(5)

²⁰⁶ <https://en.wikipedia.org/wiki/Arve>.

²⁰⁷ Convention between the Swiss Confederation and the French Republic regarding the development of hydroelectricity at Emosson (unofficial translation).

²⁰⁸ Art. 12.

²⁰⁹ Art. 14.

Treaty element	Content	Article
	Domestic utilisation of energy produced	6
	Compensation for the use by Switzerland of the waters drained from France	20
Procedural rules	Concessions for the use of the hydraulic force (80-year duration)	11-14
	Economic and fiscal provisions	15-19
	Inter-governmental consultations on key issues	19
Institutional mechanisms	Permanent Commission	4
	Joint operator	Preamble, 3, 7-10
Dispute settlement	Negotiations and if unsuccessful, arbitration	21-23

3.6.4 The compensation mechanism

The Treaty does not detail a water-energy compensation mechanism though some elements from both are linked. Its main objective is hydropower production utilised by both countries and a key element is the sharing of that energy. Water is mentioned in relation to the resources enabling the operation of the dams with particular compensation element regarding the use of water draining from France into the reservoir explained in more detail below.

Energy sharing is determined according to the following rules, the parties having acknowledged that the waters draining from both countries have equal force.²¹⁰ The overall principle is equal rights to utilize the hydropower generating infrastructure and the reservoir.²¹¹ Energy sharing is based on whether the power was generated by hydraulic force or by pumping water into the reservoir.²¹² In the first case the energy is considered jointly produced and in the second, the sharing is in proportion to the energy contributed by each country to the pumping. The countries also provide equally the energy required by the operator for distribution and for its own purposes.²¹³

Each country is free to utilize the hydropower produced as it wishes and energy not utilized by one country may be utilized by the other.²¹⁴

As regards water, Switzerland is allowed to utilise the reservoir for storing water drained from Swiss resources.²¹⁵ Switzerland may also utilise the water in the reservoir drained from

²¹⁰ Art. 5(1).

²¹¹ Art. 5(2).

²¹² Art. 5(3).

²¹³ Art. 5(4).

²¹⁴ Art. 6.

²¹⁵ Art. 1(2).

French resources.²¹⁶ However, the water drained from the basin of the Arve River into the reservoir then utilized by Switzerland for power production must be compensated for. This is done by stocking that water downstream in Lake Geneva and releasing it at the request of French authorities to enhance the use of the Rhone.²¹⁷

3.6.5 Execution by authorized power structures

The specificity of this Treaty is the sole operator of infrastructure located both in Switzerland and in France.

The operator is a private company²¹⁸ established in Switzerland and governed by Swiss law with its head office in Switzerland and an office in France.²¹⁹ Shareholding is split between an approved Swiss group of shareholders and an approved French group of shareholders.²²⁰ Each group has the same voting rights and representatives in the company bodies.²²¹ Moreover, each country can nominate a commissioner with the right to participate in different meetings in a consultative capacity.²²² Finally, the bylaws of the company and all agreements with the shareholders must be communicated to the authorities of both countries.²²³

Emosson S.A. is the company that owns the infrastructure. The Swiss company Alpiq and the French EDF are both 50% shareholders in the company.

Although there is a single operator, there is a separate concession for the infrastructure awarded by each country. Nevertheless, the conditions for the exercise of each concession must be aligned and the two countries coordinate and communicate regarding the content of the concessions. In fact, entry into force of the concessions is conditional upon the agreement by both parties of the conditions in each concession.²²⁴

While the operator has the main role in operating the infrastructure, the two countries remain directly involved on key issues. In the pre-construction phase that involved approving the project plans²²⁵ and authorising the start of operations.²²⁶ Flood management and dam draining is conducted according to rules they approve.²²⁷ They monitor modifications to the bylaws of the operator²²⁸ and nominate commissioners participating in meetings.²²⁹ Conditions attached to the concessions of both countries are communicated and accepted by both.²³⁰ They also take measures in case of issues around the concessions²³¹ as well as

²¹⁶ Art. 20.

²¹⁷ The water utilized for power production is released into the Rhone, upstream of Lake Geneva, which then becomes the Rhone again when leaving Geneva. Availability of that water has a volumetric limitation (Art. 20).

²¹⁸ It is a 'société anonyme'.

²¹⁹ Art. 7.

²²⁰ Art. 8.

²²¹ Art. 10.

²²² Art. 10.

²²³ Art. 9.

²²⁴ Art. 11-12.

²²⁵ Art. 2.

²²⁶ Art. 3.

²²⁷ Art. 3.

²²⁸ Art. 9.

²²⁹ Art. 10.

²³⁰ Art. 12.

²³¹ Art. 13.

discussing in 2045 whether to continue with the operation of the infrastructure.²³² They are involved in tax issues.²³³ Finally they consult each other regarding the implementation of measures that could impact the situation of both countries regarding the implementation of the Treaty.²³⁴ They retain important roles regarding the operation of the infrastructure.

A permanent monitoring authority is also appointed by both countries consisting of civil servants and experts from their respective administrations.²³⁵ Its main duty is to monitor the utilisation of the infrastructure and conformity with concessions as well as any issues relating to them having open access to them at all times.²³⁶ It also verifies yearly reports on energy transfer between the two countries and makes recommendations to the countries in case of issues.²³⁷ The reports it produces on its activities are communicated to the countries as a basis for them to take appropriate measures.²³⁸

²³² Art. 14.

²³³ Art. 16-18.

²³⁴ Art. 19.

²³⁵ Art. 4.

²³⁶ Art. 4.

²³⁷ Art. 5(5).

²³⁸ Art. 4.

3.6.6 Specific comments

Economic aspects

All relevant economic elements referred to in the Treaty are related to power production and particularly to the construction phase of the project. Costs are shared by the two countries.²³⁹ Goods necessary for construction and maintenance are exempt from import tax.²⁴⁰ Monetary transfers between the countries are also exempt from tax.²⁴¹

Water commoditization

There is no commoditization of water here since there is no connection between volumes of water used for hydropower and that power.

Withdrawal limitations

There are no withdrawal limitations with the exception of the compensation mechanism described above. However, sufficient water must be released to safeguard water-related interests such as public health, food production for riverine populations, irrigation, fish conservation and landscape protection, as provided for in the concessions.²⁴²

Proportionality allocation

The proportional allocation in this case study refers to energy sharing according to the rule described above. There are no references to situations of water scarcity.

3.6.7 Analysis

General comments

The Agreement in place is a bilateral agreement that focuses specifically on one project and one output, energy production. It is a fairly detailed agreement resembling a commercial contract that includes many practical elements.

What this case study highlights is the uniqueness of each situation, which translates into tailored mechanisms to address the energy and water needs of the countries involved that the parties consider fair. In this case, the location of the infrastructure at the border and the origin of the water is unique to this part of the Alps. Few other treaties include land swapping as was done for the Emosson.

Nevertheless, relevant insights emerge from the study of this project. As in other cases, the focus is principally on energy production rather than on water. There is an assumption that there will be enough water for energy production and the issue of water availability and use by each country is not addressed or indirectly with reference to the use of the stored water in the reservoir. More detail about this may be set out in the concessions that are not available online so it is not possible to verify this. Nevertheless, should there be significant changes, both countries will consult with each other particularly if they adopt measures that may have an impact on the operation of the infrastructure.

²³⁹ Art. 15.

²⁴⁰ Art. 16.

²⁴¹ Art. 17.

²⁴² Art. 3.

Three main entities are involved in the institutional framework. The two countries act directly, without any particular department or agency being specifically nominated. The joint commission has a monitoring role with no decision-making powers: those are explicitly reserved for the countries, which rely on the reports of the commission to take the necessary measures. The private sector operator is in charge of the practical aspects of the operation of the infrastructure and energy distribution in accordance with domestic legislation and market requirements. Overall, this is a lighter set-up than in other countries but one that appears successful.

There are no reports of any major issues specific to the operation of the project to be found. Issues may relate to broader regional energy matters such as pricing but Emosson has not been pointed out specifically.

Specific comments

The situation of this Treaty is quite different from the situation of Kyrgyzstan because the main focus is hydropower production and water is an ancillary issue that is hardly mentioned in the Treaty. There is therefore a limited connection between the two. Moreover, cost allocations were agreed from the very beginning and are incorporated in the Treaty. It is also a unique geographical situation that facilitates hydropower production and benefits both countries.

Nevertheless, one relevant element is the use of electricity for pumping as a criterion taken into consideration for power allocation purposes and for calculating the energy share of each country in proportion to their contributions to the electricity used for pumping. In the case of the Lesotho Project, it is the energy saved that is the basis for calculation and in the case of the Emosson is it the electricity used that represents that basis. In both cases it is something tangible that can be quantified and constitutes an important economic element. The way it is relevant is the connection to electricity and its quantification. In the case of Kyrgyzstan, the issue is the import of electricity from neighbouring countries and hence the amount of electricity imported could be a substantial element contribute to calculating a value to the water saved and stored in the reservoir during the winter period. This example and the Lesotho demonstrate that this has been done internationally.

Another point to mention is that the absence of reference to water issues means there is no mechanism in place to address the short-, medium- and long-term impacts of climate change on the operation of the reservoirs and of the hydropower elements of the dam. Thus, it does not provide an example of how to deal with this issue that is and will be affecting mountainous regions worldwide. This absence of reference is not surprising: the Treaty was signed in the 1960s when climate change was not yet a global issue let alone its effects foreseen.

3.6.8 References

Emosson @ <https://emosson.ch/>

Alpiq @ <https://www.alpiq.ch/fr/production-denergie/centrales-hydroelectriques/centrales-a-accumulation/emosson>

3.7 Agreement between India and Bhutan concerning cooperation in the field of hydroelectric power

3.7.1 Background

Bhutan is a mountainous land-locked country in the Himalayas in South Asia with a population of approximately 770k. It is known for the concept of 'Gross National Happiness'.²⁴³ China and India are its neighbours. Many rivers flow through it from west to east as well as southwards towards the Brahmaputra River in India. Its economy is principally agrarian. The development of hydropower has substantially contributed to its economic growth since completion of the Chhukha power project in 1987-1988: this strategic resource contributed in 2020 to almost 18% of Bhutan GDP. Surplus power is sold to India and is now its main export.

The Indian states of West Bengal, Assam, Arunachal Pradesh and Sikkim border Bhutan. India has a long-standing relationship with Bhutan since diplomatic relations were established between the two countries in 1968. India is Bhutan's largest trading partner and hydropower cooperation has been a pillar of their bilateral relations. India shares watercourses with other regional countries, Bangladesh, Nepal and Pakistan with whom it has a bilateral approach to transboundary water cooperation.

Since the signing of the agreement regarding the landmark Chukha hydro-electric project in 1974, other hydropower plants have been completed in Bhutan with the support of India: the Kurichhu²⁴⁴ and Tala projects.²⁴⁵ In 2006 the two countries signed the 'Agreement concerning the Cooperation in the Field of Hydroelectric Power' and a protocol related to the agreement was signed in 2009 that double the scale of power projects to 10k MW in 2020.

Consequently, three hydropower projects are currently under development: Punatsangchhu-I, Punatsangchhu-II and Mangdechhu. In 2014 a 'Framework Inter-Governmental Agreement concerning the development of joint venture hydropower projects' was also signed to develop further hydropower capacity under a joint venture structure.

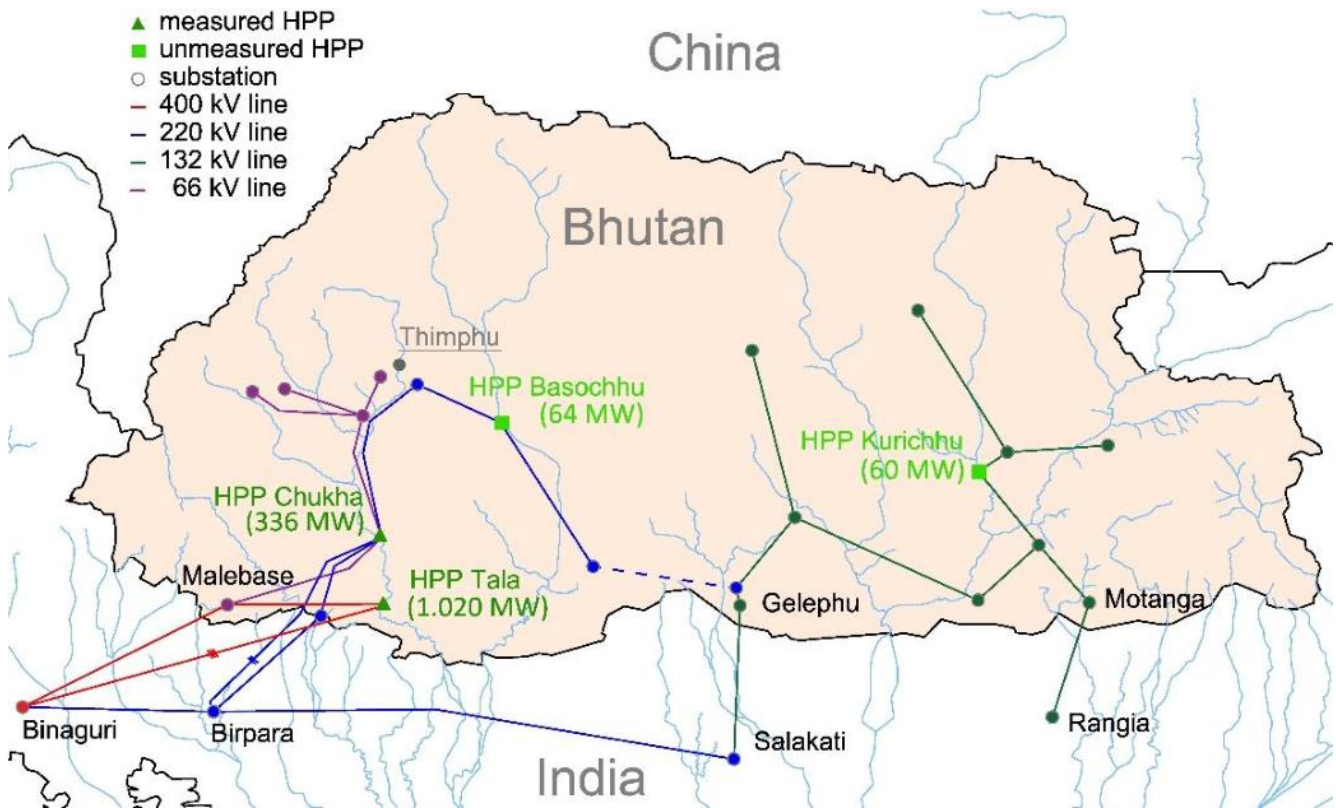
²⁴³ <https://www.gnhcentrebbhutan.org/>.

²⁴⁴ <https://www.drukgreen.bt/en/kurichhu-hydropower-plant/>.

²⁴⁵ The legal basis for this dam is the 'Agreement between the Government of the Republic of India and the Royal Government of Bhutan regarding the Tala Hydroelectric Project' signed in 1996.

Basins map:

with India



Source: Holst, A.F., Pradhan, P., & Dorji, C. (2016). Deduction of a Comprehensive Model of the Bhutan Power System for Network Stability Investigations.

3.7.2 Treaty background and status

The international agreement considered in this section is the 2006 ‘Agreement concerning the Cooperation in the Field of Hydroelectric Power’ (Agreement) and its 2009 Protocol (Protocol). The text of the 2014 Framework Agreement mentioned above could not be found online and is therefore not considered in detail.

Earlier agreements were signed by the two countries. The legal basis for the Chukha hydropower dam is the 1974 agreement about the same (Chukha Agreement). The agreements for the other dams constructed with Indian support are not available online.

All of the agreements are currently in place.

3.7.3 The treaty

References to the Agreement are marked with an A and those to the Protocol with a P. The Agreement contains 12 articles and the Protocol contains 6 articles.

Treaty element	Content	Article
Scope	Energy security for Bhutan and India	Preamble A
	Development and construction of hydropower – Accelerated under the Protocol	1A/Preamble P
	Electricity trade through public and private sector participation	1A

Treaty element	Content	Article
Substantive rules	Minimum import of 5000 MV by India by 2020	2A
	Indian assistance to Bhutan to develop minimum 10,000 MV in Bhutan and import of surplus	IP
	Government assistance for field investigations and for the construction, installation, operation and maintenance of facilities to generate, transmit and sell power in each country	4A/IIP
	Energy supply by India to Bhutan in case of power shortfall in Bhutan	6A
	India to facilitate financing and provide human resources for hydro project in Bhutan construction and operation	9A
	Cooperation in renewable energy development	8A
Procedural rules	Facilitation and preparation of detailed project reports (DPR) and implementation agency selection by a joint group	2A
	Project implementation and power purchase agreement for each project developed	3A
	Agreement content: terms and conditions including implementation, supply quantum and parameters, points of delivery and electrical power supply price	3A
	Concessions and incentives to be provided to the parties to an Agreement	5A
Institutional mechanisms	Authorized agencies for power trading designated on a case-by-case basis	IIIP
	Empowered Joint Group to fast-track approvals, monitor DPR preparation and project construction	IVP
Dispute settlement	Bilateral consultations	10A

3.7.4 The compensation mechanism

There is no compensation mechanism in this case study that links water and energy. There are no references to water. What the Agreement and Protocol indicate is that India will facilitate obtaining funding for the construction and operation of the hydropower infrastructure, as well as manpower. Separately, India agrees to purchase surplus power from Bhutan. The Agreement is a framework agreement that sets out the main principles according to which the energy cooperation between India and Bhutan is to take place and a separate agreement is signed for each new project so that the terms and conditions for funding and power purchase are specific to that project.

This was already the case before the signing of the Agreement: separate agreements were signed for each project, which contained funding and purchase provisions. The funding terms in the Chukkha Agreement are: 60% of the estimated cost is a grant and 40% a loan repayable annually over 15 years with a 5% interest.²⁴⁶ The purchase rate for surplus power paid by India is also included and is reviewed every four years based on agreed criteria.²⁴⁷ A separate provision also allows for the sale of up to 5,000KW by India to Bhutan for the dam construction.²⁴⁸

3.7.5 Execution by authorized power structures

The Agreement and Protocol identify the following project stages and relating entities or institutions:

- Project Identification and DPR preparation: the Bhutan government identifies priority projects to reach 10k MW capacity in consultation with the Indian government; both facilitate the preparation and implementation of the DPR;²⁴⁹
- Approvals and monitoring: an 'empowered joint group' (EJG) fast tracks different project related approvals²⁵⁰ and monitors DPR preparation and project construction;²⁵¹
- Project implementation: a special purpose vehicle (SPV) is formed for the implementation of each project;
- Power trading: authorized agencies designated by each government on a case-by-case basis; they determine protocols and specific bilateral instruments based on the needs of each country.²⁵²

The EJG appears to be the entity that has the overview of the different elements contributing to the cooperation since it has a role in all of the stages given its mandate and oversees all of the projects. Its composition is detailed in the Protocol, which also indicates participants in its meetings.

²⁴⁶ Art. 3 of the Chukkha Agreement.

²⁴⁷ Art. 8 of the Chukkha Agreement and Annexure for the calculation detail.

²⁴⁸ Art. 11 of the Chukkha Agreement.

²⁴⁹ The Agreement provided for an empowered joint group to do so (Art. 2) but this has been changed in the Protocol that only refers to the two governments (Art. 2A and IIP).

²⁵⁰ Implementation modalities, financing mechanisms, fund flows and contingency plans.

²⁵¹ Art. IV Protocol.

²⁵² Art. III Protocol.

The EJJ members include representatives from both countries – they may nominate other members if required:

- Bhutan: four members nominated by the government, with the Minister of Economic Affairs chairing the EJJ
- India: three government representatives²⁵³

Other meeting participants include:

- Permanent: Ambassadors of both countries (of each country to the other);
- By invitation: CEOs or MDs of the special purpose vehicle established to implement each project; chairpersons or CMDs of the SPV equity partners in the case of joint ventures; any other technical or financial experts considered by the EJJ.

No decision-making process for the EJJ is mentioned. It is assumed this is done by way of consensus.

Little information is available about the other entities mentioned though there is probably additional information in the separate agreements for each of the hydropower plants built since the Agreement and Protocol were signed.

The Bhutanese government-owned utility agency in charge of hydropower is the Druk Green Power Corporation.²⁵⁴

3.7.6 Specific comments

Economic aspects

In 2014, hydropower represented 20% of Bhutan's economy and taxation on hydropower companies provided more than 40% of the national revenue. It also constitutes 63% of its exports.²⁵⁵ The country is considered to be the only regional electricity provider with a surplus available for export. The hydropower electricity is considered to have contributed to improving the life of local communities by providing a reliable source of power though Bhutan still imports energy from India.

India has been the main purchaser, and funder, of the hydropower even if there have been other projects funded differently, for instance the Dagacchu plant for which the ADB provided a loan. The mode of project funding also has an impact on the economy: the debt for the Indian funded dams represents 70% of Bhutan's external debt and 80% of GDP.²⁵⁶ However, the pricing of electricity sold to India is considered to make the debt sustainable.

The Protocol increased the amount of electricity anticipated to be produced by Bhutan by 2020. However, it has been reported that at present the installed capacity is lower than this

²⁵³ Financial advisor and Joint Secretary (North), Ministry of External Affairs; Joint Secretary (Hydro), Ministry of Power.

²⁵⁴ <https://www.drukgreen.bt/en/>.

²⁵⁵ Royal Bhutanese Embassy, New Delhi, 'Bhutan-India Hydropower Relations'.

²⁵⁶ C. Dema, 'Why Bhutan failed its hydropower goal, and what this shows about the geopolitics of energy', The Third Pole, 9 March 2023.

objective, being just over 2,300 MW.²⁵⁷ Construction has been delayed and costs have overrun,²⁵⁸ which is matter of concern considering the economic importance of hydropower to Bhutan. Reasons for the delay are considered to be geological conditions, climate change and also administrative ones.²⁵⁹

Water commoditization

There is no water commoditization in this case study as there are no references to water in the Agreement.

Withdrawal limitations

There are no withdrawal limitations as no water is involved.

Proportionality allocation

There is no proportionality allocation as no water is involved. There are no references to situations of water scarcity.

3.7.7 Analysis

General comments

The Agreement is bilateral with a specific focus on energy. This is a framework agreement that sets out the main objective of the energy cooperation, which is achieving the development of a minimum of 10k MW by Bhutan with Indian assistance and the sale of surplus electricity to India. The detail of each hydropower infrastructure project is agreed in a separate agreement. This includes the financial terms agreed, including the nature of the financing provider, whether it is a public or private sector venture and the rate at which electricity is purchased by India.

The advantage of having a framework agreement is that it can include the main principles of the bilateral relationship with the detail being agreed separately and tailored to the specific circumstances of each infrastructure project. However, the Agreement is quite limited in what it sets out, which is principally the level of energy production capacity in Bhutan and India assistance to achieve it to support energy security in both countries. There are no references to energy pricing which is left to separate arrangements and whatever deal the parties achieve there. This is perhaps a reflection of the difference in negotiating positions of both countries that are of significantly different sizes and capacities. In terms of complexity of the terms agreed it is at the opposite end of the spectrum compared to the bilateral agreements between the US and Canada and Mexico, or the one between South Africa and Lesotho.

The main focus of transboundary water cooperation between India and Bhutan is flooding management, which is conducted entirely separately in the bilateral relationship. There are over 30 hydro-meteorological stations in Bhutan under a “Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers Common to India and Bhutan”. A joint expert team oversees the scheme and another one discusses

²⁵⁷ C. Dema, ‘Why Bhutan failed its hydropower goal, and what this shows about the geopolitics of energy’, *The Third Pole*, 9 March 2023. The website of the Druk Green Power Corporation mentions an installed capacity just above 2,200 MW.

²⁵⁸ *Ibid.*

²⁵⁹ *Ibid.*

issues around flooding. Water and energy are therefore entirely separate areas of cooperation between the two countries, for the time being.

Finally, as regards the institutional framework in place the EJG has a prominent and overarching role in the early stages of project development as well as implementation. However, its operational rules are limited and it is unclear how effective it is. A particular institutional issue has been the structure of the entity carrying out the project. The Protocol introduced the notion of joint venture rather than an intergovernmental project with a view to swifter action but that does not seem to have had the anticipated result. This seems due to the dispute resolution mechanism requiring action by each country causing delay and the decision-making process within the joint venture with a 50-50 voting mechanism preventing action from being taken.²⁶⁰ This clearly highlights the need for careful consideration of decision-making rules and of operational rules generally.

Specific comments

This case study involves principally energy. Water is the source for energy production but not a focus of any of the agreements reviewed in terms of quality or quantity. In fact, there are no references to water at all. Water issues are dealt with at a domestic level in accordance with national legislation pursuant to Art. 5 of the Agreement.²⁶¹ The lack of mention of water means that the relevance and advantages of this case study are limited for Kyrgyzstan. The focus is on upstream electricity production, as with the Mekong and with the Emosson, that is sold to a riparian neighbour. As a consequence, there is no compensation mechanism to speak of and what is in place is not related to water. Financial arrangements are made separately and are not tied to water availability or volumetric requirements downstream. Therefore, it offers limited lessons to draw from for Kyrgyzstan since at present Bhutan is not storing water for India but using it to generate electricity it then sells to India.

Nevertheless, there have been reports that with the Himalayan glaciers melting there may be an impact on water availability for hydropower production because of seasonal fluctuations. This is an aspect that is not considered in the Agreement and may be problematic in the future as previously mentioned regarding the Emosson.

3.7.8 References

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²⁶⁰ C. Dema, 'Why Bhutan failed its hydropower goal, and what this shows about the geopolitics of energy', The Third Pole, 9 March 2023.

²⁶¹ See also Art. 6 regarding technical requirements.

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3. Analysis

The purpose of this section is to analyse jointly the seven case studies presented and highlight key aspects of particular relevance to water-energy compensation mechanisms. It does not explicitly repeat the comments made regarding each case study, which can be found in the last sub-section of the sections dealing with them.

The agreements reviewed can be clustered together based on their focus:

- Hydro-electricity and water: the Columbia River Agreement; the Lesotho Highlands Water Project Agreement.
- Principally water: the US-Mexico Agreement; the Mekong River Agreement; the Maritsa River Agreement.
- Principally hydro-electricity: the Emosson Agreement; the India-Bhutan Energy Cooperation Agreement.

The Columbia River and Lesotho Highlands Water Project are the only two agreements contain clear compensation mechanisms that involve both water and energy. The others have elements of compensation in kind (the water debt of Mexico and water storage with the Emosson) and financial (the Maritsa) while the other two make no reference to any kind of compensation (Mekong and India-Bhutan).

This sample of case studies is small but helpful insights can be drawn from all of them.

The first point to note is that aside from the case of the Maritsa which is a rare case and to some extent Lesotho, the payments in the mechanisms are not directly for the water but for a service associated with the water. It can be direct with the storage of water as being the service compensated for. It can be indirect through savings gained from not pumping water and hence not utilizing electricity that comes at a cost. Other direct costs are associated with different phases of over the lifetime of the infrastructure. These can cover capital investments costs and later maintenance and operation.

The nature of the compensation also varies. Some of it is monetary and some of it is offered through the provision of free energy. Water is also offered in compensation in some of cases.

The mode of calculation of the compensation varies but is always linked to water volumes. The challenge this represents is the increasing unpredictable water variability, which is not generally accounted for. This is a challenge because users, and their governments, are looking for a degree of predictability which may no longer be possible. Flexible mechanisms with a long-term view must therefore be envisaged. Notably all of the agreements reviewed were signed in the 20th century at a time when such issues were not as obvious as they are today.

Except for the Mekong, all the other agreements are bilateral. They often involved countries that have a historical relationship but are not all at the same level of development. This could create an imbalance and an asymmetry between the parties involved and the content could be assessed against the negotiating power of the riparian countries involved. Other bilateral

and regional agreements should also be taken into account to avoid contradictions though none of the case studies highlighted this issue.

Water supply variability has been mentioned. The other important element is water demand particularly for the agreements that deal with water allocation. The issue here is the alignment of domestic needs, which may fluctuate, with international obligations. As noted in the case of Mexico this can create international tension but also tension between domestic users. The need for flexibility is therefore important.

In light of the comments about supply and demand variability and taking into account the level of detail necessary to operate the compensation mechanism, the structure and content of the agreement should be considered carefully. Where more than one infrastructure project is involved a framework agreement with separate protocols for each project may be more appropriate. Operational details can also be included in less formal instruments like protocols that can be more easily amended in case of need.

A final comment on the institutions supporting the implementation of the agreements and of the mechanisms. The case studies have demonstrated the range of possible institutions, some of which have historical roots (the IBWC) while others are more recent creations. All are related to the public sector with the exception of the Emosson entity. Their relationship with power utilities is often not mentioned. It can be assumed that this is done under national regulations that are not referred to specifically though some agreements mention the need for national regulations that facilitate the agreement implementation.

4. Market Relations Assessment

This section assesses the concept of water market relations in an international water basin context and its advantages and disadvantages against the background of international water law and of an assessment of practice around allocation mechanisms.²⁶²

4.1 The concept of market relations

Market relations can be understood as a market-based approach whereby the water is allocated according to market principles based on the economic value generated by the water-consuming activity in different economic sectors and on supply and demand. This kind of approach has been used in a national or sub-national context, in countries such as Chile, the US and Australia.²⁶³

Different reasons have been advanced to demonstrate the value of water markets. One of them is that they allow flexibility to adapt to changes in demand and in supply whether influenced by water availability, climatic conditions or demand for the outputs of the water usage such as demand for agricultural commodities. This occurs through pricing adjustments to market conditions. Another factor is the allocation of water to the use with the highest-value and the ensuing economic efficiency increases. Users with no benefit from the water sell the amount allocated to them to users who can draw substantial economic benefits from it so selling or buying water when it is most advantageous to them.²⁶⁴ Markets are also seen to provide mitigation to uncertainty because of the ability of buyers to purchase rights from other users when needed such as in the context of a drought or because of the option to purchase water options for future needs.²⁶⁵ A final element considered advantageous is the ability to obtain information about users' preferences which then permits more efficient and equitable water allocation. More generally, because transfers occur on a voluntary basis between the users this is deemed to be more equitable.²⁶⁶

Water markets require appropriate governance to operate. A basic legal requirement is the establishment of water rights that can be traded between participants in the market. These should be well-defined, rigid and secure rights that are transferable and enforceable.²⁶⁷ Moreover, there should also be an institutional framework in place that sets out the parameters and regulation of the market including trading rules, in addition to defining the water property rights. This is necessary to enable the sale and purchase of the rights so that the market is reliable and efficient.²⁶⁸

²⁶² This is drawn from the 2021 UNECE Handbook on Water Allocation in a Transboundary Context @ <https://unece.org/environment-policy/publications/handbook-water-allocation-transboundary-context>.

²⁶³ For the Australian approach, see the Government's website @ <https://www.dccew.gov.au/water/policy/markets>. For a general overview, see A. Tsiarapas and Z. Mallios (2021) A Study on Water Markets and the International Experience Gained from their Establishment, *Journal of Environmental Research, Engineering and Management*, Vol. 78 / No. 1 / 2022, pp. 6–30, DOI 10.5755/j01.ere.m.78.1.30133.

²⁶⁴ Chau, J. (2014) Water Markets and the UN Watercourses Convention, *Georgetown International Environmental Law Review*, Vol. 27(1), p. 182.

²⁶⁵ *Ibid.*, p. 183.

²⁶⁶ *Ibid.*, p. 183-184.

²⁶⁷ *Ibid.*, p. 185.

²⁶⁸ *Ibid.*

Because the situation being considered involves a transboundary watercourse, the next subsection considers how international water law may apply to such markets.

4.2 International legal perspective

The notion of market relations and its pricing corollary are not currently explicitly considered in international water law. The law's overall focus is the way in which riparian states regulate their interactions around freshwater resources they share. Two key principles, described below, provide the general parameters against which these can be assessed including possible market-based elements of the cooperation. Procedural rules such as the obligation to notify²⁶⁹ also play a role as does the notion of vital needs.²⁷⁰

The overarching principle in international water law is equitable and reasonable utilisation. It implies that all riparian countries to a shared watercourse have an equal right to utilize its water. This is not an objective standard but a subjective one: it is for the countries concerned to decide how to make this principle operational in a way that they all consider to be equitable and reasonable. The principle is incorporated in Article 5 of the 1997 UN Convention on the Non-navigational Uses of International Watercourses (1997 Convention) and is also a principle under international customary water law.²⁷¹ The 1997 Convention includes a number of factors that can be taken into account to determine what constitutes equitable and reasonable utilization allowing for flexibility in the application of the principle to the circumstances of a particular basin. These factors, which are indicative, include broadly: hydrology, geography, climate; social and economic needs of the concerned states; uses current and future; effects of uses on other states; and conservation and protection of the resource. In other words, the interests of all concerned states based must be weighed and balanced equitably and reasonably against all those factors and benefits would have to outweigh any negative effects.²⁷² Therefore, any mechanism based on a market approach should also be equitable.

The other key principle in international water law is the no significant harm, which is referred to in Article 7 of the 1997 Convention and is also part of international customary water law. According to it, states must take all measures to avoid harming substantially other riparian states. This is also a subjective principle, which means that the states concerned determine themselves what constitutes significant harm and whether all measure have been taken to try to avoid it. It is also to be taken into account to determine what is equitable and reasonable utilisation. Any economic mechanism agreed should also comply with this legal requirement and states should be able to demonstrate that they have taken all measures to avoid causing significant harm or that any harm caused is minimal.

What this means in practice is that countries are free to choose the way in which they interact over their shared waters and to establish the kinds of mechanisms described in this report,

²⁶⁹ Ibid, pp. 192-193.

²⁷⁰ Art. 10(2) of the 1997 Convention. These needs have priority over other uses.

²⁷¹ Customary international law applies to all states while the provisions of the 1997 Convention only apply to the states that are a party to it.

²⁷² Chau (footnote 269), p. 195.

whether market-based or not so long as they comply with these two principles at a minimum. International water law does not prescribe the mode of cooperation of the parties but the general principles according to which this should be achieved.

The next sub-section considers how the notion of market relations and water markets have been considered in transboundary allocation mechanisms.

4.3 Allocation mechanisms practice

Despite the fact that a market-based approach is a possible option for transboundary water allocation²⁷³ and theoretically a conceivable way forward to states wishing to make use of the pricing mechanism and flexibility it offers there does not appear to be any actual use of it. In fact, the UNECE Handbook on Water Allocation indicates that it does not feature in any of the agreements reviewed from an extensive database utilised by some of the contributors to the Handbook.²⁷⁴ In fact, it indicates that “market-based mechanisms” are not used to allocate water resources between countries²⁷⁵ and notes that this type of mechanism has been used at local and subnational levels rather than at an international one.²⁷⁶

However, one sector where a market approach has been utilised is for the pricing of hydropower benefits allocation, where it is used as a mechanism for assessing the value of electricity generated.²⁷⁷ This seems to be because it may be easier to determine the price of electricity produced via hydropower than to do so for water.²⁷⁸

What this indicates is that at present there is no precedent for establishing a water market at an international level and using market pricing in that context though it has been used for determining the value of hydropower.

4.4 Assessment

The choice of transboundary water allocation mechanism and underlying elements are open to the concerned countries to determine. As long as they comply with the requirements of international water law, they may choose the one that offers them mutual benefits whether it is market-based mechanism or another one depending on the circumstances and preferences of those countries as well as on the practical and operational application of the mechanism. There will be economic and legal elements to take into account that offer possible advantages and disadvantages.

As mentioned above, adopting a market relations approach may offer more flexibility, pricing adjusted to supply and demand, uncertainty mitigation and economic efficiency. Considering the situation at hand, there are variations in water availability and in water demand downstream and so there may be benefits for Kyrgyzstan to apply a market approach to water pricing. However, this scenario needs to be examined carefully.

²⁷³ UNECE Handbook (footnote 267), Table 1, p.22.

²⁷⁴ Ibid, p. 109.

²⁷⁵ Ibid, p. 111.

²⁷⁶ Ibid, p. 185.

²⁷⁷ Ibid, p.72.

²⁷⁸ Ibid, p. 111.

There are water markets at a national or sub-national around the world and each operates according to its own rules based on needs and practices of the local users. There is not a unified way of proceeding and there is currently no precedent at an international level. This means that there is flexibility to develop rules that benefit specifically Kyrgyzstan and its neighbouring countries, which could be an advantage. However, the efforts needed to develop and test such rules would have to be weighed against the benefits of the approach, which also need to be determined.

As in some of the case studies, the determination of the pricing could entail a combination of volume stored and released and could perhaps also include operating and maintenance costs. One could conceive that the allocation of water operates around the water being held in the dam reservoir and that each country would 'own' a certain volume. Downstream countries could then choose whether to utilise their share by asking for its release or sell it to Kyrgyzstan that could then use that water for hydropower production when needed and reduce its own imports of energy accordingly. This is of course a very basic description of the operation which would need to be fleshed out in more detail to fully appreciate the legal, operational and other types of implications as well as the practical feasibility of this proposition.

Indeed, these may present difficulties that could argue against adopting this approach. The principle of equitable and reasonable utilisation is intended to be flexible, which may contradict the requirement of a market approach of well-defined and secure rights that are enforceable and transferable as noted by some scholars.²⁷⁹ There may also be opposition to the notion of assigning ownership of the water because it is considered to be a common good to which such types of rights should not be attached. International water law has attempted to move away from the notion of sovereignty over water to make it a shared resource that is not owned by anyone. Another point with legal ramifications is the question of dispute resolution should there be a disagreement around the operation of the market and whether existing mechanisms would support the management and settlement of such disputes or if new elements should be considered.

Finally, because equitable utilisation is a subjective concept, states that would not agree with the approach could use this argument to oppose it: they could argue that the proposition is not equitable and thus does not comply with international water law. In fact, remarking on the Columbia River and the Lesotho project, one commentator stated that equity does not always equate with economic efficiency and that non-economic factors also play a role in the agreed division of benefits.²⁸⁰ Moreover, as explained earlier, the US is in the process of renegotiating the Columbia River Treaty because it no longer considers its share under the compensation mechanism to be fair.

There should also be a consideration of whether using this kind of approach and the notion of rights and ownership would raise any kind of domestic sensitivities. There may be questions

²⁷⁹ Chau, J. (2014) Water Markets and the UN Watercourses Convention, *Georgetown International Environmental Law Review*, Vol. 27(1), p. 185.

²⁸⁰ Yu (foonote 39) p. 65.

about what the approach means for domestic water management as well as its impact on internal water distribution. Transboundary water management is also driven by domestic needs and there should be alignment between domestic policies and international obligations and there would be a need to ensure that the approach supports such alignment.

Also important is the economic aspect of the approach from the different perspectives of water and energy. How would the market approach integrate the issue of electricity pricing, which is one of the central elements of the current situation. Should the pricing of water be connected to it and how? And how could that connection be done in a manner that is economically advantageous and satisfactory to Kyrgyzstan but also to the downstream countries and equitable? More generally, the question is whether the approach offers more benefits than other possible approaches to establishing an economic mechanism connecting water and energy between Kyrgyzstan and its neighbours. One option is also to make use of elements from a market approach rather than an approach only based on it.

Overall, there may be advantages to the adoption of the approach but it would have to be tested to be able to determine more specifically what these are. Some of the obstacles mentioned above may also materialise and challenge the development and implementation of such an approach so there are a number of possible disadvantages to adopting it. To be able to make a more specific pronouncement on the matter the first step would be to identify what the benefits of the market approach would bring to Kyrgyzstan and to the neighbouring countries compared to another way of setting up an economic mechanism.

Ultimately the law is flexible as it allows the parties to discuss and select a mechanism and an agreement that will suit their needs the best. International water law does not impose it on them. It would accept a market-based approach that satisfies the parties and complies with its principles so that benefits outweigh impactful effects and vital human needs taken into account and that all parties agree with.

5. Recommendations

This section presents three recommendations about how to approach the development of a mechanism for water and energy coordination. They are not suggestions of actual mechanisms but recommendations about the elements to take into account to develop a mechanism that addresses the specific situation of Kyrgyzstan and of its downstream riparian neighbours. Prior to that, the current situation, including legal aspects, is briefly presented.

5.1 Current situation

A key challenge that Kyrgyzstan is facing, and wishes to address, is the economic loss caused by the non-use of the water in the Toktogul dam reservoir during the winter season. The reason for this is the requirement to accumulate water during that period in order to be able to then release it during the summer season to the Syr Darya downstream countries pursuant to the 1998 Agreement on the Use of Water and Energy Resources of the Syr Darya Basin between Kyrgyzstan and Kazakhstan, Uzbekistan and Tajikistan (the 1998 Agreement).²⁸¹ However, the consequence of that situation is that Kyrgyzstan is unable to produce electricity during that time and instead, to address the need for power, imports electricity from neighbouring countries at market value pursuant to separate commercial agreements.

There is consequently an asymmetry in terms of the benefits as they are currently shared despite what was agreed since the 1998 Agreement states that Kyrgyzstan is entitled to compensation. The objective, therefore, is to identify a mechanism that will operationalise and implement it.

Indeed, the preamble clearly sets out the objectives of the cooperation and makes specific reference to a precise and 'fair' solution to use the water and energy resources of the Syr Darya basin. Article II makes reference to compensation for energy losses, on an 'equivalent' basis. Article IV refers to the nature of the compensation for annual and multi-year water irrigation storage in the reservoirs that will 'be made in equivalent amounts of energy resources' that include electricity. There is also a specific reference to monetary terms agreed by the parties. As regards tariffs for energy resources, there must be a single policy for all energy resources and their transport. Article V lists the kinds of guarantees that may be used by the parties to comply with their obligations. They include: lines of credit, security deposits or other forms. Finally, Article X indicates the issues to be considered jointly, which include: replacing barter settlements by financial relations; developing pricing mechanisms based on a single tariff policy and the use of water. Therefore, the principle of compensation is already agreed and the 1998 Agreement can serve as a basis for opening discussions on an appropriate economic mechanism regarding the water – energy nexus.

An important point to take into consideration is the dynamic situation of water availability and demand in the short, medium and longer term. Climate change is likely to impact how much

²⁸¹ References to the 1998 Agreement are based on a translation into English available here: http://www.cawater-info.net/library/eng/l/syrdarya_water_energy.pdf.

water is available in the basin generally and there may also be fluctuations, and increases, in demand for water. There may be similar dynamism in energy demand and production. Both aspects will need to be taken into account so that the operational elements of the mechanism can be adapted and adjusted to changing situations while remaining related and fair to all the parties concerned.

5.2 Recommendations

This section makes three recommendations for possible solutions and highlights important points in relation to each.

5.2.1 Recommendation 1

The first recommendation relates to determining what are the *benefits* relating to the water and energy.

To identify an appropriate mechanism what the benefits entail in relation to all the concerned countries, including Kyrgyzstan, needs to be clarified. This is a basic but crucial starting point to be considered both before being discussed and as part of the negotiation process.

Identifying them allows to determine how to share them in other words how to articulate the economic mechanism despite the challenges to establish what they are.²⁸²

The concept of 'benefit sharing' was first introduced by Claudia Sadoff and David Grey in their paper 'Beyond the river: the benefits of cooperation on international rivers'²⁸³ and further developed in the paper 'Cooperation on international rivers, a continuum for securing and sharing benefits'.²⁸⁴ They define different types of benefits including 'benefits from the river' derived from joint management of the shared river yielding increases in food and energy production for example.

One way of approaching what constitutes the benefits in the situation at hand is to consider them from two related points of view: as a service being provided; and as a cost related to providing that service, the compensation for which can be construed to represent a benefit.

For example, storing water upstream is one of the services that has been provided in three of the case studies, between the US and Mexico, Canada and the US and Switzerland and France. In the US-Canada mechanism the purpose (or benefit) of the service is the prevention or mitigation of the flooding risk downstream and enhancing hydropower production downstream. In the case at hand the service is also the storage of water within infrastructure for the benefit of downstream countries so that they have access to water at the time they require it. Another benefit could be ensuring the availability of water during drier periods and others could be acknowledged.

Turning to the costs of the services, these must be quantified and monetised by Kyrgyzstan so that the compensation for them, also representing a benefit, can be determined.

²⁸² Yu (footnote 39), pp. 7, 64-64.

²⁸³ *Water Policy* 4 (2002) 389-403.

²⁸⁴ *Water International*, Volume 30, Number 4, Pages 420–427, December 2005.

The case studies have provided indications of possible bases to take into account for quantification such as:

- volumes of water (stored or released); and
- operation and maintenance costs of the infrastructure being used;
- hydropower production, which for Kyrgyzstan could be reversed and quantified as hydropower not produced;
- energy imports from neighbouring countries.

As for the compensation, the case studies have demonstrated it can be:

- Financial payments (or whichever other terminology is most appropriate); or
- In kind, in water or in energy.

Determining what is most appropriate will depend on the quantification exercise as well as the preference for one or the other, or both, depending on what might constitute the most suitable option for Kyrgyzstan (or even other types of compensation) and what might be most mutually beneficial. One option could be to have only financial payments, another would be to have only in-kind compensation, which could be water then used for hydropower production or electricity imports. A third option would be to have a combination of both types of compensation with ratios and quotas to be agreed according to formulas agreed with all the countries. This particular option could be helpful for instance to address variations in supply and demand. For example, water that is not necessary one summer could be utilised in winter for hydropower production in Kyrgyzstan.

There is no single formula to make the calculation and to estimate what this represents for Kyrgyzstan but it must establish what those benefits are and the possible range in order to have a basis and a strategy for negotiating with the downstream countries.

The monetisation of the compensation is where a market approach could be taken into account either in relation to water or to electricity. This would require underlying assumptions and rules about the market structure and operation to be determined and agreed by all parties.

Importantly, the discussion about the benefits enjoyed by all the countries should also be an element of the negotiation process so that the content is determined and acknowledged by all. That legitimacy will strengthen the next element of the process, which is the determination of the mechanism through which these benefits will be implemented.

5.2.2 Recommendation 2

This second recommendation relates to the possible *components of the mechanism* and a proposed approach to determine them.

This approach is based on the framework used to analyse the agreements of the case studies and its five elements: scope, substantive rules, procedural rules, institutions and

dispute resolution.²⁸⁵ Its purpose is to break down the different elements of the mechanism and of its operation and ensure that all relevant aspects are considered and included. It is relevant because of its application to water treaties.

Scope

This element of the framework is where the geographical and functional definitions of the resource are set out. This is therefore where reference could be made to the shared water resource, the Syr Daria and to its tributaries, to the infrastructure involved, to the way in which the infrastructure is used and the purpose of that use for all parties concerned amongst which storage.

An explicit link between water and energy could also be made here as a basis for the mechanism.

Substantive rules

These rules are the ones that set out the legal rights and duties of the parties and are therefore where the articulation of the mechanism and its operation are described. They answer the question 'who gets what, when and for what?'. They also clarify the connection between water and energy and refer to the principles of international water law and who they apply, particularly the notion of equitable and reasonable utilisation.

The quantification of the benefits mentioned in the previous recommendation will be elaborated in this component based on relevant elements such as temporal and volumetric aspects (for both water and electricity). Water volumes may be average, high or low to express them in simple terms and timing can be short-, medium- or long-term.

Based on insights from some the case studies the following points should be considered:

- Setting out a water baseline that represents an average (and the compensation appropriate for it) and allows for the calculation of variations to adjust to changing conditions and water requirements;
- Considering the value of water in circumstances of abundance and in a context of drought for the calculation of variations and related compensation (whether financial or in kind);
- Considering how to address the variations if they represent more or less water for Kyrgyzstan and what compensation to obtain for the different options;
- Considering different possible scenarios of water variability based on forecasts being made as a result of climate change to assess options in light of the two points above.

This list is indicative rather than exhaustive and there may be other points that come up and need to be taken into account to guide the development of the mechanism. A key consideration regarding the design of the mechanism is that there is, and will be, variability in both water supply and demand, and possibly similar fluctuations with regard to energy needs

²⁸⁵ See p. 6 and footnote 4.

in Kyrgyzstan. This presents a significant challenge for the design because adjustments may need to be made that may affect prior planning decisions and the dynamic nature of the situation needs to be accounted for.

Different scenarios are possible when combining the factors. For example, volumes stored over the summer that were not utilised during that period could be utilised in winter to generate electricity and reduce electricity imports. Using a market approach that water could be traded at an economically suitable price. Another possible scenario could involve requesting additional volumes to be stored during the winter period ahead of a forecast drought. In that case a mechanism would allow for extra electricity to be purchased at a suitable cost to compensate for extra water being stored ahead of the irrigation period. Many more scenarios could be envisaged; it is hoped that the ones just presented give an indication of how to consider the different elements listed in this recommendation.

Procedural rules

Procedural rules establish the practical and operational implementation of the substantive rules. They answer the 'how', 'when' and 'by who' questions of the mechanism. Implementing it requires knowing when decisions would be made, using what process and which institution or entity is involved. This includes elements such as planning, consultations, joint monitoring and data exchange.

Here are for reference some elements, inspired by the case studies, to consider:

- Planning for water and electricity done in advance for a certain period of time to avoid the need for yearly negotiations and to allow for upfront compensation to facilitate compliance; for example, the Mexico-US agreement uses a five-year period; the Lesotho Project also uses the notion of projected water delivery and energy production as a basis for calculations; in the US-Mexico, there was an upfront payment for a period of 60 years;
- Assessing after the planning period actual events (volumes actually stored and released; electricity imports and any other element) at an appropriate moment against the original planning and compensate where necessary; in the Lesotho Project there are monthly water readings; in the US-Canada situation there are weekly and monthly adjustments; in the US-Mexico volumetric allocations are checked after five years;
- Considering how changes or variations to the planning could be organised: what would be the format and procedure to follow for downstream countries to request additional water (when to be submitted, etc.);
- Data generation and exchange processes to support these different elements (if not already in place);
- Process to assess the validity of the procedure in place and propose changes if it does not operate as desired; this is where the system of minutes in the Mexico-US situation could inspire a suitable mechanism.
- Timing of payments or provision of an agreed in-kind compensation; in the case of the Lesotho project, payments occur monthly based on data monitored regularly.

Institutions

Institutions facilitate transboundary water cooperation and the institutional aspect of the mechanism also needs to be considered. The different case studies provided examples of different types of institutions with different roles and powers.

The nature, duties and powers of a joint institution will depend on the mechanism agreed and its operation. Nevertheless, it may be likely to deal with matters such as inter-state and inter-sectoral coordination (water and energy), data exchange, notification procedures, consultations and so forth. A particularly important point is the national and inter-state institutional set-up in the water and electricity sectors. Existing national mandates regarding forecasting, planning, coordination, implementation and monitoring are key points to examine because they should also facilitate the implementation of the mechanism. As mentioned above, the joint institution could also be empowered to address variations and make adjusting changes to the system in place. The Mexico-US minute system is one example that allows for adjustments to be made. Borrowing from this concept one possibility could be the joint institution making recommendations to be confirmed by each concerned government with any refusal to confirm needing to be justified by the party opposing it.

Finally, and importantly, the operational and institutional elements of an agreed mechanism would have to be assessed against existing institutions to determine whether they will support the mechanism agreed as they are or if adjustments need to be implemented.

Dispute resolution

This final component encompasses not only mechanisms for dispute resolution but also systems for compliance monitoring. The latter is particularly important in light of the need to verify data regarding volumes of water stored and released (irrespective of the economic mechanism ultimately agreed) and to verify data around electricity imports to ensure compliance with the agreed mechanism.

The basis for the compliance mechanism is likely to be the operational plans, particularly if those are developed in advance, with data relating to the plans exchanged according to the procedures set in place as mentioned above. Variations of the operational plans are key areas of focus because of their impact on the benefit sharing agreed. An assessment of compliance looking back may be challenging to achieve and may not ensure that compliance. The case of Mexico's water debt is an example of the practical challenges this poses so perhaps operational plans submitted in advance, as in the case of the US-Canada mechanism, could provide better answers. Consequences for non-compliance must also be considered. For instances, if payments are involved penalties could be applied for late payments or other relevant financial instruments.

Disputes can be of different types and seriousness so dispute resolution mechanisms should be designed so they address the right disputes. For instance, smaller disputes could be solved by the joint institution and more important one regarding compliance for instance could be escalated to national agencies and ministries. Arbitration and adjudication would be appropriate for disputes around legal issues.

5.2.3 Recommendation 3

This third recommendation relates to *legal and policy aspects*.

The question here concerns existing legal and policy instruments in the water and electricity, and their ability to support the economic mechanism to be developed. They will therefore need to be reviewed and assessed to determine whether there are existing limits or whether they can form the basis for it.

Regarding the international legal instrument that will contain the economic mechanism, the question is whether the 1998 Agreement can be used as a basis since it already includes the basic principles of cooperation and the concept of compensation. If so, once the mechanism is agreed it would have to be incorporated through an amendment of the Agreement and perhaps other relevant elements would also need to be included to support the implementation. An alternative could be to set aside the 1998 Agreement and to negotiate a completely new agreement though this may be a lengthy process. Irrespective of the path chosen, flexibility should be built in to address variations that have been anticipated by parties and also those not anticipated by the parties so institutional processes to address that last point will be important.

Other legal instruments to be considered are those that relate to the electricity imports. Their status would need to be considered and the necessary adjustments made in light of the role of energy in the mechanism. Notably these are commercial agreements rather than state to state agreements so a careful examination of any implications of changes to them need to be conducted.

To conclude, the economic mechanism that will be agreed will be the result of a process taking into account the points made in the three recommendations.

6. Conclusion

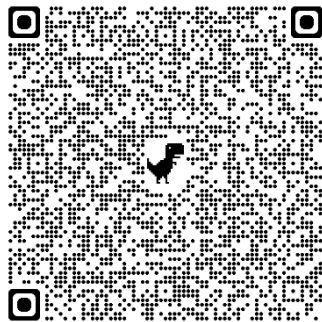
This report addresses three tasks in support of the WAVE Project.

For Task 1, it provided a detailed analysis of international practices on interstate relations in water management using various compensation mechanisms based on a review of seven agreements, which included the Columbia River Agreements between the US and Canada; the Colorado, Tijuana and Rio Grande Agreement between the US and Mexico; the Water Agreement between Turkey and Bulgaria; the South Africa-Lesotho Highlands Water Project Treaty; the Mekong River Basin Agreement; the French-Swiss Emosson Hydroelectric Project Agreement; and the India-Bhutan Hydroelectric Cooperation Agreement. Elements of Task 2 was integrated into the analysis of the seven case studies and detailed the operating conditions of compensation mechanisms of each including the mechanisms for the execution of decisions by authorized power structures. Each of these case studies offered useful insights into the complex issue of water and energy connections in an international context. Another component of Task 2 was a review of the concept of market relations in the management and use of water resources in international practice including an assessment of possible advantages and disadvantages. Finally, three recommendations were developed for Task 3 which included elements of possible scenarios for the water-energy mechanism based on international water law.

Task 3 relied on the insights gained from the case studies but did not copy exactly any of the compensation mechanism in each. Indeed, none reflected the exact situation that Kyrgyzstan is facing and each presented a number of disadvantages as a result. What each of the examples illustrates that whatever mechanism agreed is adapted to the specific needs of the basin countries. Thus, a similar will need to be followed to determine the most appropriate mechanism for Kyrgyzstan and its neighbouring riparian countries.

This process can be guided by the key points that emerged as a result of the overall assessment undertaken. Notably, international water law is flexible and allows for the selection of what the parties consider suitable for their needs so long as it complies with its principles. This could also include market relations though these have not been tested in an international context. Another important point is the need to balance predictability and flexibility. Erratic precipitation caused by climate change is one area that requires flexibility in light of its impact on water availability. Water resources management and energy production also do to adjust to changing supply and demand. Finally, awareness of domestic needs and regulation, whether related to water or to energy, is also important so that international obligations are aligned with national demand.

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