

**Troubled trans-boundary cooperation in South Asia:
Indo-Nepal water resources treaties
Gandak and Mahakali Treaties**



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1. Introduction

The demand for fresh water of the world is increasing and the availability of fresh water is diminishing with time due to various reasons. Climate change, development activities and ever increasing pollution due to human activities have created stress to meet increasing demands. Due to imbalance in need and availability and the ownership on resources gives rise to conflict between and within nations. The conflict exists all over the world. The conflict is more profound when the resource is a trans-boundary river or a resource is in succession eg a river. Conflict over the ownership of Transboundary Rivers is more eminent when there is power imbalance among riparian states that are in conflict and a state/country is more influential and could put authoritative pressure onto the other.

In recent century, Nepal and India have entered into several water resources agreements for the utilization of trans-boundary or rivers in succession. The first recorded document is the letter written by the then ruler of Nepal, Chandra Shamsher Rana in 1920 for the construction of Sarada Barrage; a barrage to be constructed by India on International boundary river Mahakali River. Similarly an agreement was reached in 1954 regarding the construction of a barrage in Kosi river; a river in succession between Nepal and India. The agreement on utilization of Gandak River was done in 1959. All these three agreements have been executed according to the agreement, although the Kosi Agreement and the Gandak Agreement were amended after some time after signing as Nepalese side felt that these agreements did not give fair share of benefits to the country. Mahakali River Treaty, on the other hand, is the latest Agreement between the two countries in resources utilization of a boundary river consisting of water sharing.

This study analyses the shortcomings in implementation of Indo-Nepal water resources treaties between two riparian/neighborly countries with regards to the “ Gandak Irrigation and Power Project” (The Gandak Treaty) and "Integrated Development of the Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project (the Mahakali Treaty)".

Dissatisfaction persists in Nepal about the benefit sharing of water resources between the two countries. Development and sharing of water-related benefits have been a key component in relation between the two countries.

2. Treaties

“Gandak Irrigation and Power Project” Agreement was formulated for the construction of barrage, canal systems serving in India and Nepal, a hydropower plant to supply power to Nepal as well as afflux bunds, spurs and embankments. The river Gandaki originates in Tibet and constitutes major catchment area upto the Gandak site lies in Nepal. Whereas, "Integrated Development of the Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project" concerns with the utilization of Mahakali River. Mahakali River is a boundary river in major stretch which flows through India before joining River Ganga.

2.1 Gandak Irrigation and Power Project

Nepal and India signed the Gandak Irrigation and Power Project (GIPP) Agreement to harness water of the Gandak River for the benefits of the people living on both sides of the border on December 4, 1959. Subarna Shamsheer Rana, the Deputy Prime Minister of Nepal and Bhagwan Sahay, the Ambassador of India signed the Agreement. Like Kosi agreement, this treaty also has water sharing between the two countries and constituted of flood control and management, development of hydropower, irrigation, prevention of erosion and navigation for both countries. The Agreement allowed India to construct a 739 m long barrage on the Gandak River at its own cost at the Nepal-India border located between the districts of Nawalparasi in Nepal and West Champaran in Bihar, India.

2.1.1 Irrigation component

Irrigation infrastructure consisted two main canals one each on both banks of the River; (a) Main Eastern Canal (MEC) and (b) Main Western Canal (MWC). Main Eastern Canal lies in Indian Territory and one of its two branches called as Don Branch Canal from which one branch takes off as Nepal Eastern Canal (NEC) and goes towards Nepal to irrigate 41,400 ha command areas in Bara, Parsa and Rautahat districts of Nepal. This was later revised to 37,200 ha. The Main Eastern Canal goes to irrigate 920,520 ha in Bihar State of India. Main Western Canal goes through the territory of Nepal for about 19 km length and then enters into India. The Main Western Canal irrigates 930,000 ha in Uttar Pradesh State of India and 4,700 ha in Nawalparasi district of Nepal. The other canal is Nepal Western Canal (NWC). This canal takes off from the right bank of the Gandak River upstream of the intake of Main Western Canal. The Nepal Western Canal irrigates 16,000 ha in Nawalparasi district of Nepal.

2.1.2 Power Development

Under the Agreement, Government of India constructed a powerhouse on the Main Western Canal with installed capacity of 15 MW in the Nepalese territory. The powerhouse was commissioned in April 1979. On the Indian side, another 15 MW powerhouse was also constructed.

2.1.3 Amendment of the Agreement

Nepal considered this agreement as unfair in benefit sharing and hence demanded for re-negotiations. The agreement was revised on April 30, 1964. With the amendment the head regulator of the Don Branch Canal to be operated by Government of Nepal and instead of sharing available water during shortages on pro rata basis, a provision of requirement of separate agreements between Government of Nepal and Government of India for the trans-valley use of Gandak waters in the months of February to April was introduced.

2.2 The Mahakali Treaty

The Mahakali Treaty was signed in 1996 for the integrated development of the Mahakali River for the benefit of the both countries. Major components of this treaty are still to be fully implemented and realized even after 25 years.

Dissatisfaction persists in Nepal about the benefit sharing of water resources between the two riparian/neighbor countries. Development and sharing of water-related benefits have been a key component in relation between the two countries.

2.2.1 Making of Mahakali treaty

The River forming the western border of Nepal with India and separating the Far western Province of Nepal from Uttarakhand State of India is known as the Mahakali River in Nepal and Kali River at upper stretch and Sarada River at lower stretch in India. At the confluence of the river with River Ganga, total catchment area is 15,260 sq km. The river is the fourth largest river flowing from Nepal into the River Ganga system. The contribution of the river to River Ganga flow in annual basis is 698 Cumecs, which is about 6% of the River Ganga Flow. The major tributaries of the Mahakali from the Nepalese side are Chameliya River, Surnaya Gad and Tinkar Khola. Major tributaries that join the river from the Indian side are Dhaul Ganga, Gauri Ganga and Sarju Rivers.

There is a dispute regarding the origin of this river between Nepal and India. The Mahakali River is called as Kali (Kuti Yankti) River in the upper region, which originates from Limpiyadhura.

According to the Sugauli Treaty of 1815 between the Nepal and British regime in India, the land east of Kali River is stated as the land belonging to Nepal. The maps published between 1816 and 1856 shows that the river coming down from Limpiyadhura is the Kali River. But, India claims that a rivulet originating between Tinkar and Kalapani is the Kali River. India established a para-military camp at Kalapani area in 1962 during the China-India war and since then the camp has been staying there. This border issue has not yet been resolved between India and Nepal.

On February 12, 1996, the Mahakali Treaty was signed by the Prime Ministers of India and Nepal. Before this treaty, India and Nepal had already had understandings for the utilization of the Mahakali River: (i) Letter sent by the Nepali Prime minister regarding the construction of Sarada Barrage in 1920 and (ii) An agreement regarding the construction of barrage at Tanakpur in 1991.

a) Sarada Agreement

Although bilateral agreements efforts were made to harness the Mahakali waters in the past. First ever effort was formalized between Nepal and the then British India in 1920 through an exchange of letter. The letters of Exchange dated 23 August 1920 and 12 October 1920 took place between Rana Prime Minister Chandra Shumshere of Nepal to Colonel Kennion of the British Legation at Nepal for development of the Sarada Canal Project. The treaty exchanged 4,093.88 acres (1,618 ha) of Nepali land lying on the eastern bank of the river for construction of the Sharada Barrage on the Mahakali River at Banbassa bordering the present Mahendranagar in Nepal with an equal amount of land from the British Indian Government. The construction work was completed in 1928. The Agreement also provided for the construction of a power station at Khatima in connection with the Sarada Canal Project in the State of Uttar Pradesh in India.

Under the agreement, Nepal obtained the right to use a minimum of 400 ft³/sec ie Cusecs (11.33 Cumecs) and a maximum of 1,000 cusecs (28.35 Cumecs) of water from the Sarada barrage for irrigation purposes. The Mahakali Irrigation Project was completed in 1980 and utilizes this share of water for irrigating areas in Kailali district through Mahakali Irrigation Canal. On the contrary, the design capacity of the Sarada Main Canal, which provides irrigation to east central Uttar Pradesh of India, is 326 Cumecs. Average water India uses from Sarada Canal is 248 Cumecs. The provisions of the Sarada Agreement indicate that much of the benefits from the project went to India although Nepal provided its territory without which this project would not have been possible.

b) Tanakpur Agreement

In late 1988, India started constructing the Tanakpur Barrage on the Mahakali river a few kilometers upstream of the ageing 1920 Sarada Barrage. This project was to divert the river to Indian Bank and build a Hydro-electricity plant of 120 MW installed capacity. India unilaterally

constructed the project. India started the survey works of Tanakpur Power Project in 1980s. During the time, India said that India would consult and participate with government of Nepal before any construction work is started.

In December 1991 during the visit of the then prime minister of Nepal to India, a Memorandum of Understanding (MoU) was signed for tying up eastern afflux bund of Tanakpur to the higher land in Nepal. India completed the barrage construction in 1992. With the MoU, the Government of Nepal made available an area of about 2.9 ha of Nepali land for tying up of the left afflux bund of the Tanakpur Barrage to a higher ground. In lieu of this, the Indian Government would construct the head regulator near the left under sluice of the Tanakpur Barrage to provide a maximum of 28.3 Cumecs of irrigation water to the Nepalese side. The MoU also provided 10 million units (kWh) of electricity annually to Nepal free of cost. The quantity of 10 million units of electricity to Nepal was doubled later on.

c) Mahakali treaty

A big controversy erupted between the two countries after signing the Memorandum of Understanding (MoU) of Tanakpur Agreement, 1991. After going through long acrimonious feelings the fait accompli of India was legalized through a new Treaty between the two countries called Treaty between Government of Nepal and Government of India for the "Integrated Development of the Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project (the Mahakali Treaty)". It was initialed between the foreign ministers of India and Nepal on January 29, 1996.

On February 12, 1996, a Treaty between Government of Nepal and Government of India concerning the "Integrated Development of the Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project" (the Mahakali Treaty) was signed. The objective of the Treaty was joint utilization of trans-boundary water resources of the Mahakali River. The Treaty has 12 Articles and consists mainly of three components – Sarada Barrage, Tanakpur Barrage and Pancheswar Project. This treaty replaced earlier understandings on these matters.

Two projects have already been executed by India using the water of the Mahakali River at her own cost. The first two Articles of the Treaty include Sarada Barrage and Tanakpur Barrage. The inclusion of these barrages in the Treaty validated the agreement/MoU for the duration of the Mahakali Treaty ie 75 years.

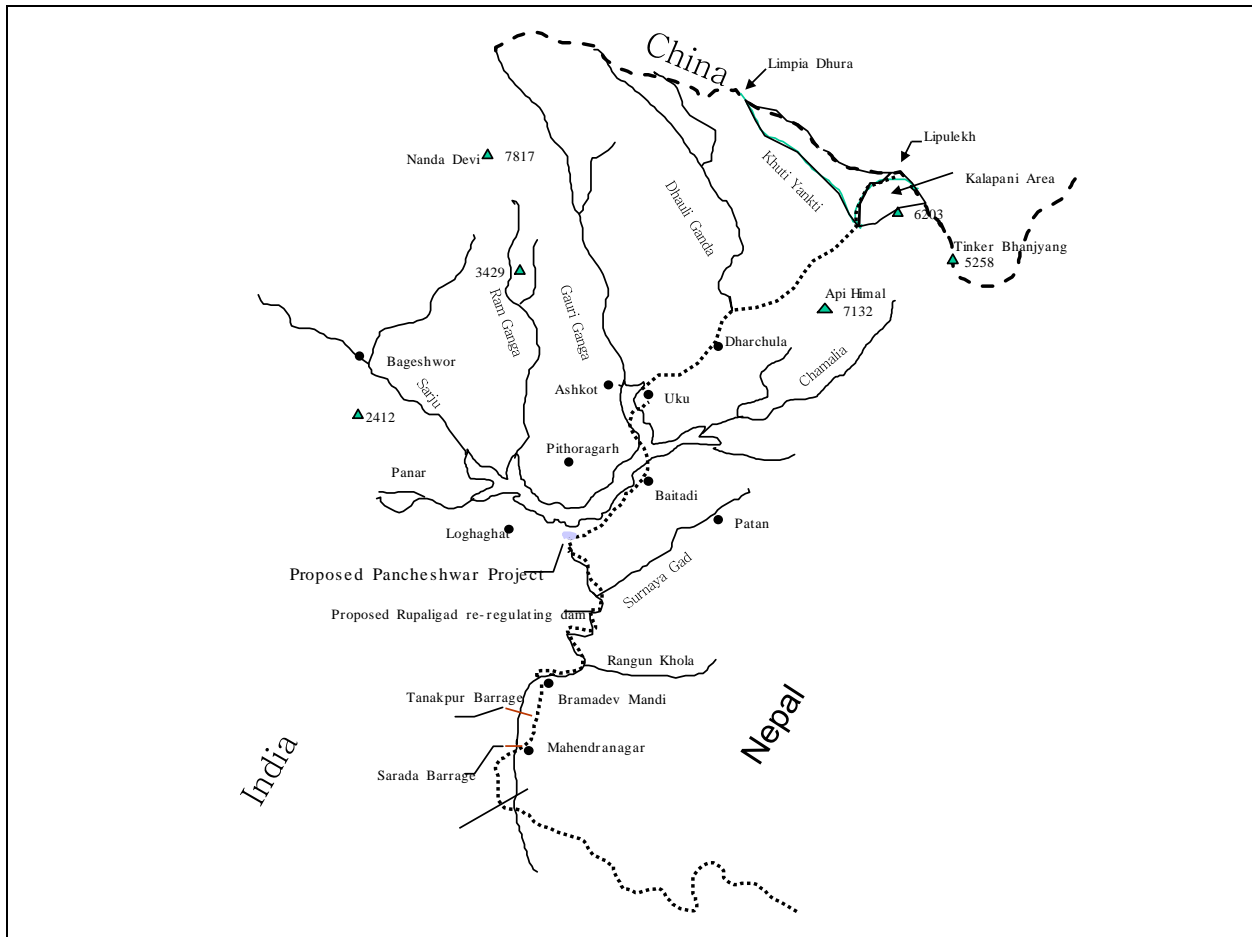


Fig. 1 Mahakali River and the location of the structures related with Mahakali Treaty

The constitution of Nepal requires that any sharing of resources be ratified by a two-third majority of the combined session of both the houses of the parliament. Accordingly, amidst strong discussion, approval/disapproval from many parliamentarians, the treaty was ratified on 20 September 1996. In the process, a supplementary “Letter of exchange” between the Prime ministers was made to clarify regarding the sharing of Mahakali River water. Also, a national statutory was also made. A “Parliamentary Monitoring Joint Committee” was also formed on 1 November 1996 under the leadership of the Speaker of the House of Representatives to monitor the execution of the treaty.

The Mahakali Treaty entered into force with exchange of instruments of ratification on 4 December 1997 during the visit of Indian Prime Minister Indra Kumar Gujral to Nepal. The Treaty entered into force from June 5, 1997.

The Treaty provisioned the establishment of a joint Indo-Nepalese Mahakali River Commission. This Commission is to be guided by the principles of equality, mutual benefit and no harm to either of the countries. The Commission has a mandate for overall development, conservation and utilization of the Mahakali River as envisaged by the Treaty including examination of any

differences arising between the two countries concerning the Treaty's interpretation and application.

On principle, the Mahakali Treaty endorsed the Sarada Treaty and continues to give Nepal 28.35 Cumecs in wet season and 4.25 Cumecs in dry season of water from Sarada Barrage. If the Sarada Barrage becomes non-functional for some reason, this quantity of water is to be given from the Tanakpur Barrage. The treaty validated the Tanakpur Agreement as well and reaffirming the Nepalese sovereignty, on the 2.9 ha land provided for building the eastern afflux bund of Tanakpur Barrage, as well as the 9 ha of pondage area. The treaty gave Nepal the right to 28.35 Cumecs of water in the wet season and 8.50 Cumecs in the dry season. During Tanakpur agreement, 20 million unit (kWh) of electricity from the Tanakpur was agreed to be given to Nepal free of cost annually. In this treaty, this quantity was increased to 70 million units (kWh). The basis for 70 million kWh of energy was derived from the incremental power generation at Tanakpur Power Plant due to tying of eastern afflux bund to the higher ground in Nepal.

The treaty agreed to develop a bi-national multipurpose project Pancheshwar Multipurpose Project (PMP), on the Indo–Nepal boundary river of Mahakali with “equal entitlement in the utilization of the waters of the Mahakali River and without prejudice to their respective existing consumptive uses of the waters”. The principles for the development of the project to be done optimizing the net benefit of electricity, irrigation, and flood benefit etc. The principle of cost sharing based on the benefit accruing to each side was also established.

Mahakali Treaty is to remain valid for a period of 75 years. The provisions of the Treaty must be reviewed by both countries at 10-year intervals or earlier if requested by either country and amendments thereto will be made, if necessary.

Indian government provided the comments on the Feasibility Study report of Nepalese side in July 1997 claiming that a total of 201 Cumecs water of Mahakali River for Sarada Sahayak Command area at Lower Sarada Canal for a command area of 2.0 million hectare in addition to 248 Cumecs of water being utilized from Sarada barrage at Banbasa for 1.61 million hectare as the “existing consumptive uses”. The lower Sarada barrage lies some 160 km downstream of Sarada barrage of Banbasa.

3. Status of Treaties

Nepal and India entered into various water resources related treaties. Although the intention of these treaties was to develop the resources for mutual benefit, the execution of these treaties was very poor.

3.1 Gandak Irrigation and Power Project Agreement

The Gandak Irrigation and Power Project (GIPP) Agreement provided irrigation water for the Gross Command Area (GCA) 14,480 lakh hectare in Bihar and 14,480 lakh hectare in Uttar Pradesh of India. In Nepal, the project provided water for irrigation in the gross command area estimated to be about 40,000 acres through Western Nepal Canal. Also, through Eastern Nepal Canal for providing irrigation water for the gross command area estimated to be about 1,03,500 acres.

The Government of India is to construct one Power House with and installed capacity of 15,000 KW in Nepal territory on the main Western Canal. It also includes a transmission line from the Power House in Nepal to the Bihar border near Bhainselotan and from Sugauli to Raxaul in Bihar in order to facilitate supply of power on any point in the Bihar Grid up to and including Raxaul.

The Government of India shall supply power to Nepal at the Power house and/or at any point in the Grid up to and including Raxaul to an aggregate maximum of 10,000 kW up to 60 percent load factor at power factor not below 0.85.

3.2 Status of Implementation of Mahakali Treaty

The utilization of Mahakali river flows stated more than a hundred years. It took several stages before an integrated approach could take place. Although the Mahakali treaty was signed in 1996, even after 25 years of implementation most of the provisions are still pending to be effectively implemented. Some of the issues regarding the implementation of the Mahakali Treaty are described below;

3.2.1 Sarada Barrage

With the Letters of Exchange in 1920 between British India and Rana Prime Minister of Nepal, the Sarada Barrage on the Mahakali River was constructed and was completed in 1928. The treaty exchanged 4,093.88 acres (1,618 ha) of Nepali land lying on the eastern bank of the river for construction of the Sarada Barrage. Before the exchange of this land ie before 1920, Mahakali was a border between Nepal and India at the location of the Sarada barrage. With this

exchange of land the both banks of Sarada Barrage lied in India. In lieu with the exchange of land, Nepal was entitled 4.25 Cumecs of water in dry season and 28.35 Cumecs of water in wet season. This allocation of water was made in 1920 but it took more than 50 years for Nepal to utilize the water; only after the construction of the Mahakali Irrigation Project in 1980. On the other hand, India has a maximum capacity to divert 325 Cumecs of water. India diverts annual average of 248 Cumecs of water from the barrage to the Sarada Main Canal for irrigation. India also generates electricity at Lohia power plant (41 MW) utilizing the Sarada canal flow.

This agreement of Exchange of land for Sarada Barrage and the water for Nepal has been included in the Mahakali Treaty signed in 1996.

3.2.2 Tanakpur Barrage

In early 1980s, while survey work of Tanakpur Barrage was being conducted by the Indian side, Nepal raised her concerns about the project. Although, it was said that if the project is to be constructed, India would collaborate with Nepal, but India went on its own and built the project in 1989. The barrage of the project required to be tied to higher ground in Nepali territory and would submerge an area of land in Nepal.

On December 6, 1991 a “Memorandum of Understanding” was signed between Nepal and India and the MoU provided an area of about 2.9 ha of Nepali land for tying up of 577 meter of the Left Afflux Bund of the Tanakpur Barrage to a higher ground. And in exchange the Barrage was to provide 28.35 Cumecs of irrigation water in wet season and 8.50 Cumecs in dry season to the Nepalese side. In addition to this, Nepal would get 10 million units (kWh) electricity.

This quantity of electricity being too small, Indian side agreed to provide 20 million units of electricity from Tanakpur power plant.

This understanding although said to a “Memorandum of Understanding” was declared as a “treaty” by the Supreme Court of Nepal requiring to be ratified by the parliament of Nepal as per the Constitution of Nepal. Due to the lack of understanding among the political parties and within the parties in the agreement, the treaty was not ratified the Parliament.

Provisions in the “Memorandum of Understanding” regarding the Tanakpur barrage was later included it in the Mahakali Treaty with some modifications.

3.2.3 Water from Tanakpur Barrage

The delivery of water from Tanakpur Barrage as per the provision of the Mahakali treaty requires a head regulator at the barrage and delivery canal passing through the Indian Territory. As per the provision of the project, the sill level of the regulator for the delivery canal was proposed at an elevation of 245 meters. The corresponding sill level for intake canal for Indian side was at 241.5 meters. The pond level of the barrage was at EL 246.7 meters. Nepal wanted the sill level at the same level as on the Indian power canal head regulator at 241.5 meters. It took 15 years to agree the sill level of the head regulator at 244.25 meters.

Although the sill level has been agreed, the construction of the canal length of 1.2 km to be built by the Indian side from Tanakpur Barrage to the Nepal–India border is yet to be completed. The issue of finalization of the sill level has significantly delayed the construction of the main canal in Nepalese side. The construction is undergoing since long. Hence, Nepalese side getting water as provisioned in the treaty which was agreed some 25 years ago is still to be realized.

3.2.4 Power from Tanakpur power plant

In lieu of tying the Tanakpur barrage to higher ground in Nepal, Nepal received monetary compensation for 20 million units from 7 July 1992 to 4 June 1997. From thereafter as per the Article 2-2b of the treaty, Nepal has been receiving 70 million units (kWh) of electricity free of cost annually from Tanakpur hydropower plant. Although, the agreed quantum of electricity in the initial Memorandum of Understanding was 10 million units, it was increased to 20 million units on pro rata basis. With the treaty the quantity of electricity was increased to 70 million units per annum.

If power generation at Tanakpur Power plant is enhanced due to augmentation of the flow due to construction of dam/s at upstream, Nepal is entitled for half of the enhanced production of electricity.

3.2.5 Pancheshwar multipurpose project

The Pancheshwar multipurpose project (PMP) is the most important component that would be developed under the Treaty. The project is a bi-national project to be developed in the Mahakali River at a stretch where the river is the border between Nepal and India. The project is proposed as a multipurpose storage project for accruing benefits including power, irrigation and flood control. The Treaty has laid out the principles of design and implementation of the Project. The project will require a re-regulating dam for regulating the flow from the PMP to fulfill the environmental requirements and irrigation need. The project is to be optimized for maximizing the total net benefit. The Article mentions that the power stations of equal capacity will be established on each side of Mahakali and will be operated in an integrated way. The cost of the

project was to be shared by both countries in proportion to the benefits accruing to each of them. Nepal could sell a proportion of Nepal's share to India.

The treaty envisages that the Detailed Project Report would be prepared within 6 months of treaty. Nepal and India had studied the project separately and jointly. A substantial volume of field investigation works has been done.

The “Letter of Exchange” related with the Treaty targets to complete the project in 8 years from the date of the agreement. To this date nothing has emerged over the past 25 years.

Based on the field investigation works which started in 1960s, in 1971, Water and Power Consultancy (WaPCos) Limited prepared a pre feasibility level report. It suggested a 247 metre high concrete gravity dam at Pancheshwar with powerhouse at dam toe of 1,000 MW installed capacity. Apparently, Pancheshwar was to operate as base load power plant. In 1995, Nepal prepared a feasibility report of Pancheshwar Multipurpose project based on the field investigation works carried out in Nepalese territory and available data of the Indian investigations in 1995, prepared a draft DPR of PMP in 1995. The report suggested a 315 meter high Earth Core Rockfill Dam (ECRD) and a dam toe peaking powerhouse of capacity $12 \times 540 = 6,480$ MW. A re-regulating dam was proposed at upstream of Rupaligad confluence with installed capacity of 240 MW.

After the Mahakali Treaty entered into force on June 5, 1997, the DPR of PMP was to be prepared within 6 months. In 2000, Indian side proposed installed capacity of a $16 \times 350 = 5,600$ MW and a reregulating dam at Poornagiri with installed capacity of 1000 MW. It was realized that previous independent works done by both sides were not sufficient and additional and joint investigations and studies were needed for the main dam as well as for an appropriate re-regulating dam. It was decided to set up a Joint Project Office-Pancheshwar Investigation (JPO-PI) at Kathmandu with field offices at the project sites in 1999. The JPO-PI was established in May 2000 and carried out required field investigations at Pancheshwar main dam, and re-regulating dams at Rupaligad and Purnagiri sites between 2000 and 2002. JPO-PI tried to prepare a DPR in 2002. As there were many differences on majority of issues for preparing a joint feasibility report, the DPR could not be prepared. The Joint Project Office (JPO-PI) was discontinued in July 2002.

In October 2008, it was agreed to set up “Pancheshwar Development Authority” (PDA) for implementing the Project. It took six years to establish PDA and a joint PDA was set up in September, 2014 in Mahendranagar of Nepal. Subsequently, the work of preparing of DPR was awarded to an undertaking of the Indian Government Water and Power Consultancy (WaPCos) Limited. The WaPCos prepared a draft Detailed Project Report in November 2016. This study recommended a “Earth core rock-fill dam” of 311 metres height and the installed capacity of $16 \times 350 = 5,600$ MW and a re-regulating dam at Rupaligad with installed capacity of 240 MW.

The report is being considered by the both sides and no agreement has been reached on the report.

3.2.6 Irrigation water for Dodhara Chandani

The Article 4 of the Mahakali treaty allocates 10 Cumecs of water for the irrigation of Dodhara Chandani area in Nepal which lies downstream of Sarada Barrage and on the right bank of the Mahakali River. Although, the treaty gives emphasis to the need of water of Nepal, these areas are deprived of irrigation water. Details of ways and arrangements for the supply of Irrigation water for Dodhara-Chandani area from a section of Sarada Main Canal in India, is yet to be finalized. Dodhara Chandani areas of Nepali territory getting water as provisioned in the treaty which was agreed some 25 years ago is still a far away dream.

3.2.7 Ecological releases

As per the Treaty India is required to maintain a flow of not less than 10 cusecs (9.91 Cumecs) downstream of the Sarada Barrage in the Mahakali River to maintain and preserve the river ecosystem.

4. Analysis of the Treaties

4.1 Gandak treaty

After execution of the project after the Gandak Irrigation and Power Project (GIPP) Agreement, Nepal realized that India received huge irrigation and flood control benefits. For execution of the project, Nepal sacrificed its fertile land for unfair share of benefits. On the other hand, India side is of the opinion that the project was entirely financed by India and Nepal got reasonable benefits at practically no cost. The difference in perception of the parties of the treaty has created the mistrust between the two countries. Some of the benefit issues related to the treaty need further analysis;

Irrigation Benefits

The Agreement mentions that Nepal will get irrigation from the Project. Irrigation command area that would be irrigated from the project in area is 46,900 ha. However, the Agreement is silent on the irrigation benefits that India would get from the project. It is understood that the water from the Gandak barrage irrigates some 1.850,520 million ha of land in Uttar Pradesh and Bihar.

Nepalese districts like Parsa and Bara are not getting agreed quantity of water. As per agreement, the government of India has to supply 850 cusecs of water through Nepal Eastern Canal (NEC) to irrigate land in Bara and Parsa districts of Nepal. The supply has been in the range of 500-600 cusecs only. At many times, it is delayed and not available when it is needed.

Nepal has been thriving to receive the agreed quantum of water from the system.

Restriction in inter basin transfer of Water

The Gandak Agreement restricts Nepal from inter basin water transfer which would decrease the flow of river in dry season. The amendment to the Agreement made in 1964, included a provision of requirement of separate agreements between GoN and GoI for the trans-valley use of Gandak waters in the months of February to April. This provision puts restriction in transferring the water from the Gandak Basin to another basin during lean season. In coming days, Nepal may need to execute the projects which would reform the flow regime of the river and water availability at the barrage site. This may create conflict between the parties.

Validity Period of the Agreement

In any river basin, water balance changes with passage of time. Any agreement on sharing of international water resources is made for certain period of time or validity time. The Gandak Agreement envisages a construction of a barrage across the river and constitutes other physical infrastructure which has definite useful life. No international agreement on sharing of water

resources can be perpetual. But the Gandak Agreement does not mention the validity time. This is going to create a misunderstanding between the parties at the time when the project components approaches useful life time.

Upstream Watershed Conservation

For maintaining the required flow in the river, maintaining and conserving the watershed is of a prime importance. There are various factors such as climate change, degradation of the watershed, climate change, siltation in the pondage etc which needs to be addressed for maintaining the required flow in the river. The Agreement does not address such issues. This will create misunderstanding in the future and the project may become nonfunctional.

4.2 The Mahakali Treaty

The Mahakali Treaty has stated explicitly about the quantity of water for Nepal. The treaty is silent on quantity of water that India is entitled. Apparently, all remaining water after deduction of Nepal's share is available to India. Nepal shall receive a total of 66.7 Cumecs of water from the Mahakali during the wet season (i.e. from May 15 to October 15) and 22.75 Cumecs of water in the remaining dry season (i.e. from October 16 to May 14) from Sarada barrage and Tanakpur Barrage. This amounts to 41 Cumecs of annual water consumption. Should Sarada Barrage become non-functional for any reason Nepal shall receive this water from Tanakpur Barrage.

Since the effective date of the Mahakali treaty Nepal is entitled to receive water as per the provisions of the Treaty. After 25 years, Nepal is yet to utilize additional water on top of quantum of water that was been already been utilizing from Sarada barrage under the Sarada Agreement of 1920. This amounts to 12 Cumecs of water.

India is yet to construct the head regulator at the left under-sluice of the Barrage and the required canal to the India-Nepal border. After more than 25 years, Nepal has not received any water from Tanakpur barrage which was agreed in the treaty.

As per the Treaty provision, Nepal desperately needs water for Dodhara-Chandani area. This issue has serious implication on the bilateral water cooperation between the two countries.

At present, Nepal utilizes 12 Cumecs of water from Sarada Barrage through Eastern Mahakali canal in Nepal. India withdraws annual average of 248 Cumecs of water through Western Sarada canal. The carrying capacity of the Sarada canal is 325 Cumecs, which is utilized to the fullest capacity during wet season. Once, the infrastructure comes into operation at Tanakpur Barrage and water for Dodhara-Chandani area is available then Nepal will be using 41 Cumecs of water.

The finalization of the components of Pancheshwar Multipurpose Project and the sharing of benefits from the project is not possible until the share of water allocated to the each side is agreed between the two sides. The provision made in the Article 3 of the Treaty states that the

project is to be designed “without prejudice to the existing consumptive uses of water of the Mahakali River”. Until the Quantity of “existing consumptive uses” is determined, the project cannot be designed and benefit accruing to both sides cannot be accessed.

The purpose of the Treaty between Government of Nepal and Government of India concerning the Integrated development of the Mahakali river including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project (the Mahakali Treaty) was to resolve the controversy of the Tanakpur agreement which was made in December 1991. The purpose of the treaty was also to give integrated approach for the development of water resources of the boundary river the Mahakali River in a holistic approach. However, during ratification of the treaty in the parliament, serious reservations were raised. This required clarifications on many issues of the treaty. A letter of Exchange was done between the two Prime Ministers to clarify several provisions of the treaty. On the 20th September, 1996 the Mahakali Treaty was ratified. A “All party joint monitoring committee” led by the speaker of the house of representative was also formed to guide the Nepalese side to implement the project and to overview the followings (i) export of energy and its pricing principle, (ii) formation of Mahakali River Commission, (iii) equal sharing of waters of the Mahakali River after the Pancheshwar project and (iv) status of the Mahakali River.

Soon, the issues of the existing consumptive use of Mahakali River arose soon after the treaty came into force. The major difference that came up was regarding the protection of existing consumptive use in India. India considers that the system of two million hectares of land irrigated from the lower Sarada Barrage is existing consumptive use under the treaty, whereas Nepal considers that the system is outside the scope of the agreement.

As per Article 1 of the treaty, should Sarada Barrage becomes non-functional, water provided to Nepal from the Sarada Barrage (a maximum of 28.35 Cumecs) is to be provided from Tanakpur Barrage. Nepal had requested India to construct the head regulator and link canal for a combined capacity of water from Tanakpur and Sarada (a carrying capacity of 56 Cumecs). India did not respond it positively.

5. Conclusion

Nepal and India shared cooperation on water resources in the past through various treaties/projects. The experience of Nepal-India cooperation on water resources in the past has not been very smooth. There exists doubt and low level of trust on water resources co-operation between the two countries. All major treaties/understandings between two countries went into controversies and faced difficulties and required amendments. Even after amendment, the beneficiaries feel that they did not get tangible benefits from the venture.

It is the general understanding that the benefits from the Gandak Project did not materialize to the extent that it was designed. The canals supply a smaller command area and water available is not available at the time when it is needed. There is lack of coordination between the farmers and the barrage operators. Agricultural productivity have not improved significantly as water release is irregular and does not follow the schedule.

The maintenance of the irrigation canals is not sufficient. Sedimentation in canals and structures affects the efficiency of water deliverability. There is severe deficiency in maintaining the system and the capacity of the whole system to deliver service is very poor.

The project affected people who were displaced or deprived of their land when the barrage and related structures were constructed still claim that they have not been compensated.

In case of the Mahakali Treaty, many concerned people consider that the Treaty did nothing but only endorsed the Sarada Treaty and validated the Tanakpur Agreement. Other than that the Mahakali Treaty remained stagnant.

The full implementation of Mahakali Treaty is far from satisfaction and is entangled in interpretation of the provisions of the treaty. Mahakali Commission was never formed.

Water for irrigating Dodhara-Chandani area from Sarada western canal has not been initiated. The issue of supply of much needed irrigation water to Dodhara-Chandani area nowhere near from execution.

Water for environmental flow from Sarada Barrage is not being released during dry season and immediate downstream of Sarada Barrage is left dry due to diversion of all water for irrigation purposes. Environmental release from Sarada Barrage as per treaty during dry season needs to be released without waiting for flow augmentation from Pancheshwar Project.

Water from Tanakpur barrage has not been provided yet in absence of infrastructure which was to be constructed by India. Supply of water from Tanakpur Barrage to Nepal is still pending for this or that reason. The benefit that could have been accrued in the last two decades has foregone.

The main contention between the two countries regarding the existing consumptive use in the Indian Territory and henceforth the water allocation to each side for the assessment of benefit and the cost apportionment to each side has been the main hurdle in making progress of implementation of Pancheshwar Multipurpose project. Although there are other minor contentions on way to formulate the Pancheshwar project (such as energy pricing, water availability, and consumptive use upstream of the Pancheshwar project) until the issue of utilization water in Lower Sarada irrigation system is solved, the progress in implementation of Pancheshwar Multipurpose Project is not possible.

6. Recommendations

The major reason for very low utilization of trans-boundary Rivers between Nepal and India is that there is a wide difference of the two countries as regards to priority in optimum use of benefits. For Nepal priority lies in utilizing the water resources for economic prosperity.

Gandak and Mahakali water sharing agreements have not been able to smoothen the relation between two countries that became sour after the Sarada and Koshi agreements. Nepal seems to have taken these agreements as unfair sharing of benefits and India gets right to use these resources for its own benefits. Gandak and Sarada/Tanakpur barrages of Mahakali treaty are entirely financed by India but irrigation and flood control benefits from these barrages goes to India at the cost of loss of land in Nepal. From Indian point of view, Nepal was given a reasonable amount of benefits at practically no cost. No doubt that there is lack of trust between the two countries as regards to cooperation in developing trans-boundary waters

Proper managing of infrastructures in the Gandak Irrigation and Power Project (GIPP) Agreement should be sufficient to improve the effectiveness of benefits delivery to the beneficiaries. Timely release of water as per agreed schedule, proper and regular maintenance of the barrage, canal and structures of water delivery system will ensure delivery of water in justifiable and timely manner.

Mahakali Treaty has been unsuccessful as regards to implementing Pancheshwar project for mutual benefit. Implementation of the provisions related to sharing of water resources at Tanakpur barrage has been extraordinarily slow. Even after 25 years after the treaty, Nepal has not been able to get any additional agreed share of benefit, other than what has been available before the Mahakali treaty. .

The main contention between the two countries regarding the existing consumptive use in the Indian Territory and henceforth the water allocation to each side for the assessment of benefit and the cost apportionment to each side has been the main hurdle in making progress of implementation of Pancheshwar Multipurpose project. Although there are other minor contentions on way to formulate the Pancheshwar until the issue of utilization water in Lower Sarada irrigation system is solved, the progress in implementation of Pancheshwar Multipurpose Project is not possible. The contention has not been solved in more than two decades and is not expected to be agreed upon remaining within the provisions made in the treaty. Only way out for utilizing the water resources of trans-boundary/border river Mahakali for mutual benefit is to reformulate the Mahakali treaty based on mutual trust and transparency.

The treaty could be reviewed as stipulated in the treaty.

References

- Ahmad, Q.K.; Verghese, B.G.; Iyer, R.R. Pradhan, B.B. and Malla, S.K. (eds.) 1994. *Converting Water into Wealth-Regional Cooperation in Harnessing the Eastern Himalayan Rivers*, Institute for Integrated Development Studies, Kathmandu.
- Bagale, D. R. (2019). Mahakali Treaty: Delay in Implementation and Resulting Impacts on Benefits From Nepal's Perspectives.M.Sc. Thesis, Nepal Engineering College, Pokhara University Nepal
- Bagale, D. R., Adhikari K D. Mahakali Treaty: delay in implementation and resulting impacts from Nepal's perspective. *Water Policy* 22, pp 658–669.
- Dhungel, D.N. 2009. Historical Eye View. In: *The Nepal-India Water Relationship Challenges*. (eds. D.N. Dhungel and S.B. Pun), Springer Science +Business Media B.V. pp. 11-68.
- Dixit , A, Shukla, A. (2017) Benefits and burden; A case study of Gandak River Agreement. Institute for Social and Environmental Transition (ISET)-Nepal and Action Aid Nepal.
- Gyawali, D. 2003. *Rivers, Technology and Society- Learnings the lessons of water management in Nepal*. Himal Books, Nepal.
- Hearns, G. 2007. The Mahakali River Treaty- Applying a New Lens to Past Efforts for Future Success. In: *Natural Resources Security in South Asia- Nepal's Water* (eds. F. Rotberg and A. Swain), Institute for Security and Development Policy, Stockholm, Sweden, pp.141-170.
- Malla, S.K. 1995. Case Study of Kosi and Gandak Projects. In: *Water Resources development - Nepalese Perspectives* (eds. B.B. Thapa and B.B. Pradhan), Konark Publishers, Delhi.
- Manandhar, M.S. and Koirala, H.L. 2001. Nepal-India Boundary Issue: River Kali as International Boundary. In: *Tribhuvan University Journal*, Vol. XXIII, No. 1 June, 2001. Retrieved from- <http://www.nepjol.info/index.php/TUJ/article/viewFile/4550/3782>
- Pradhan, B.K. 2009. Personal Reflections: Nepal-India Water Relations. In: *Nepal India Water Resources Relationship Challenges* (eds. D.N. Dhungel and S.B. Pun) Springer, pp. 243-267.
- Pun, S.B. 2009. Tanakpur Barrage-Thirteen Year Saga of the Nepal Canal Sill Level. In: *HydroNepal-Journal of Water, Energy and Environment*, Issue No. 5 (July, 2009), Media for Energy Nepal, Kathmandu, pp. 10-15.
- Pun, S.B. 2007. Whither Indo-Nepal Water Resources? Part III- Issues and Episodes to Reflect on Gandak River: Indo-Nepal Gandak Agreement, Amendment and Gandak Master Plan Study. *Vidyut* Year18, No.1: pp. 1-11.

Pun, S.B. 2006. Water Resources. In: *Nepal Conflict Resolution and sustainable Peace-Foreign Policy and Development Issues* (eds. D.N. Dhungel and A.M. Shrestha), Institute for Integrated Development Studies, Kathmandu, Vol 2, pp.67-147.

Salman S.M.A and Uprety, K. 2002. *Conflict and Cooperation on South Asia's International Rivers – A Legal Perspective*. The World Bank, Washington.

Thapa, B.B. and Pradhan, B.B. 1995. *Water Resources Development –Nepalese Perspectives*, Konark Publishers, Delhi.

Upadhyay, S. N. 2009. The Mahakali Treaty: View from the Negotiating Table. In: *Mahakali Treaty-Pros and Cons for Nepal* (eds. A.P. Srestha and P. Adhikari), Sangam Institute, Kathmandu, pp. 101-144.

Upadhyay, S.N. 2005. The Legal Regime on Water Resources in Nepal. In: *International Watercourses Law for the 21st Century-The Case of the River Ganges Basin* (ed. S.P. Subedi), Ashgate Publishing Limited, Hampshire, London. pp. 195-209.

Upreti, T. 2006. *International Watercourses Law and Its Application in South Asia*. PairaviPrakashan Publishers, Kathmandu.